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AUGUST
1939

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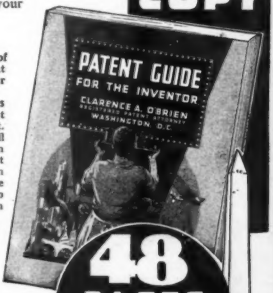

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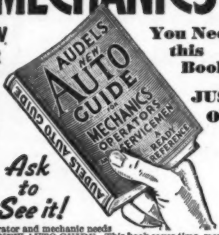

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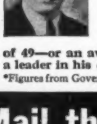

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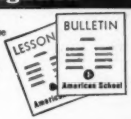
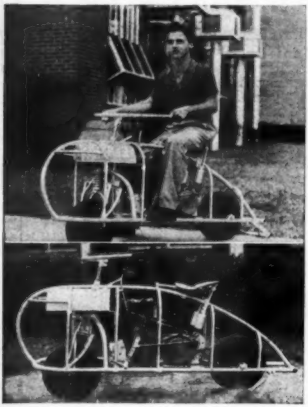


Name..... Age..... Occupation.....

Street..... City..... State.....

CHIPS *from the* EDITOR'S WORKBENCH

Send in photos of your completed workshop projects. Each month Mechanix Illustrated awards a first prize of $5 for the best photo and letter received by this department and prizes of $3 each for all other photos and letters used. Do not send negatives. Photos submitted will not be returned unless accompanied by return postage.

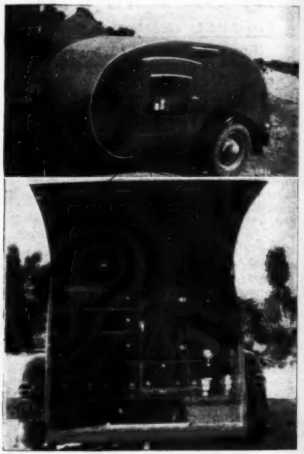


Don Vreeland took a year to build this streamlined motorcycle, but now that the job is finished he really has something. It will do forty miles an hour in second speed, has a top speed of over sixty, and can travel close to a hundred miles on a gallon of gasoline.

THE good old summer time is the ideal time for long trips over the open road. Maybe Don Vreeland of Ames, Iowa, had that in mind when he designed and built this neat looking streamlined motorcycle. Whether he did or not, we think it is tops for the month, and so we are awarding Don first prize of $5.

The power plant of Don's motorcycle is a one cylinder engine rebuilt from an old twin. The machine has a three speed transmission, a knee-action front wheel and an internal cable-controlled brake. It will do forty miles an hour in second speed, better than sixty in high, and its gasoline consumption is only about one gallon for every hundred miles.

This is a first class job, Don, and ought to bring you a lot of fun.



Lawrence Stevens built this camp trailer which he has already towed more than 5,000 miles. He uses it mainly for fishing or hunting trips. It weighs 680 pounds and cost $75 to build.

Lawrence Stevens of Maywood, Calif., constructed a camp trailer. Result: one $3 award. The sides are made of half-inch plywood, doing away with ribs. The roof is of quarter-inch plywood. The interior is covered with artificial leather padded with felt. The trailer is wired for both 110 and six volt lighting systems, and among its features are an inner spring mattress on the bed, a built-in baby bed, an icebox of 25-pound capacity, a water tank holding seven gallons and a 12- by 16-inch sink. The total weight is 680 pounds and it was built at a cost of $75. Very good!

* * *

A unique swimming, cycling and rowing ex-

[*Continued on opposite page*]

Editor's Workbench Chips

[*Continued from opposite page*]

This swimming, cycling and rowing exerciser is the brain child of Fred Pilates, an instructor of the St. Louis Physical Culture Club. He says it makes giving lessons in swimming a pleasure rather than a task.

erciser brings a $3 prize to Fred Pilates of St. Louis, Mo. Fred, who is an instructor in the St. Louis Physical Culture Club, designed the machine primarily to assist him in giving swimming lessons. Pupils are strapped in a safety belt which is attached to a rope which passes through a swivel pulley. The instructor holds one end of the rope, relaxing his hold as the pupil makes progress and gains confidence. The device effectively does away with fear of deep water so prevalent among beginning swimmers. It also eliminates the necessity of teaching on a crowded beach.

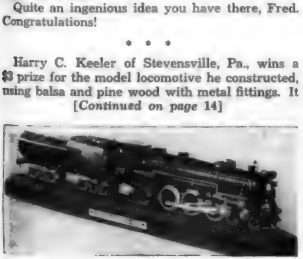
The apparatus was easy to construct, Fred writes. Each pontoon was made of four flat gasoline tanks from old trucks. The tanks were first screwed together, then soldered around the screw holes to prevent leaks. Each pontoon is about twelve feet long and when disconnected can be used as a surfboard. The entire device weighs 95 pounds, can carry ten persons safely and can be assembled or taken apart in five minutes. Fred carries it from lake to lake on top of his car.

Quite an ingenious idea you have there, Fred. Congratulations!

* * *

Harry C. Keeler of Stevensville, Pa., wins a $3 prize for the model locomotive he constructed, using balsa and pine wood with metal fittings. It

[*Continued on page* 14]



The model locomotive above was built of pine and balsa wood with metal fittings by Harry Keeler. It is a working model with authentic action of the side rods and valve gear.

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RAY F. KUNS, Dept. A-8
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Editor's Workbench Chips

[*Continued from page* 13]

is built to a scale of 3/16 inch. No castings are included in its construction. Boiler, domes, wheels, and bell were turned of pine and the drivers are also made of pine. The engine is a working model with authentic action of side rods and valve gear.

* * *

An airplane built in his spare time brings an award of $3 to John W. Peterson of Grand Rapids, Mich. The ship is powered with a 30 horse power engine and has a top speed of 90 miles an hour.

This airplane, powered with a 30 horse power engine, was constructed by John Peterson. It has a top speed of 90 miles an hour and will do 35 miles on a gallon of gasoline.

John says he can travel about 35 miles on a gallon of gas, which is very economical. The plane has a wing span of 25 feet and weighs 350 pounds empty. Allow us to congratulate you on a fine piece of work, John. We hope you have many happy landings in your neat little ship.

* * *

Bryan Crawford built this radio cabinet and sent the photo to MI from his home "down under" in New Zealand.

From far off Christchurch, New Zealand, J. Bryan Crawford sent in a radio cabinet he built, to win a $3 award. He made the cabinet of three-ply wood bent around a pine frame. The grill on the front is cut from sheet copper, chrome plated and

[*Continued on opposite page*]

Editor's Workbench Chips

[*Continued from opposite page*]

backed with a cream silk material. Good enough, Bryan! We are always glad to hear from our faraway readers.

• • •

James McCormic of Battle Creek, Mich., drew the plans for and constructed a hand printing press for which we are glad to award him a $3 prize. It uses standard metal type, the inside of the chase being four by six inches. The frame is constructed of maple except for the base, the bearings are of babbitt and the shafts of steel.

James McCormic constructed this printing press at a cost of $4. It uses standard metal type. Built chiefly of maple, it has been in use six months without giving any trouble.

The roller was cast from regular roller composition. The only power tools used were a jigsaw, a circular saw, a sander and a wood turning lathe. The cost was around $4.

• • •

Malcolm Hale and Vern Jacobs of Oakland, Ind., constructed a garden tractor from motorcycle and farm machinery parts, and so won a $3 award. An Excelsior single cylinder engine furnishes the motive power, the transmission is from a Harley-Davidson motorcycle, the wheels

[*Continued on page* 16]

This farm tractor was constructed by Malcolm Hale and Vern Jacobs. It is strong enough to pull a 10-inch single plow, a five-foot disc harrow and other farm machinery.

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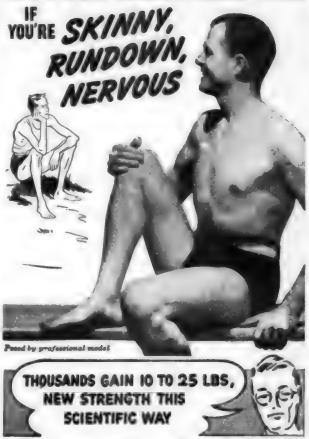

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Editor's Workbench Chips

[*Continued from page 15*]

and axle from a mower and the gears from other machinery. The frame is built of four-inch angle iron. Clutch and gas feed are operated from the handles, which came from a plow. A useful machine, boys.

• • •

A "Midget Miller" constructed from MI plans by Howard Peterbaugh of Toledo, Ohio, is a worthy winner of a $3 award. Howard is no newcomer to the Workbench pages, his "popcycle" scooter having been a money winner in the March, 1937 issue. The "Midget Miller" is powered with a half a horse power washing machine engine. It will go from 15 to 20 miles an hour and around a hundred miles on a gallon of gasoline. The cost of building was $30. Howard's 20-months old son, Daryl Duane, is pictured at the wheel. Fine!

This "Midget Miller" was constructed by Howard Peterbaugh from MI plans. It is powered with a half a horse power, gasoline engine from a washing machine. Daryl Duane Peterbaugh, aged 20 months, is at the wheel.

• • •

A sport runabout motorboat is the work of Jack Scheiblauer of Riverside, Ill., and knocks down a $3 prize for him. It is nine feet, eight inches long and its power plant is a nine horse

[*Continued on opposite page*]

Editor's Workbench Chips

[*Continued from opposite page*]

Powered with a nine horse power motor, this speedy runabout will travel 33 miles an hour. It is nine feet, eight inches long. Jack Scheibler is the builder.

power motor, which drives it along at a speed of 33 miles an hour. With an oak frame and 5/16 inch oak planking, the boat is finished off in the style of a 16- or 18-foot craft. Looks like a pretty speedy little job, Jack.

• • •

Alan Brown of Clearwater, Fla., sent in a rather novel project, a Punch and Judy theatre, and deserves, we think, an award of $3. The puppets are hand carved from pine and are worked from underneath by a hidden puppeteer.

The Punch and Judy theatre above is the work of Alan Brown. It can be folded together for transportation. By charging a small admission to his shows, Alan has made his project a profitable one.

The theatre is five feet high and has a cypress frame covered with black oil cloth. Lighting consists of footlights, overhead lights and one backstage light. Alan has produced several shows with his theatre.

• • •

John Higginbotham of Oakford, Ill., is knock-

[*Continued on page* 18]

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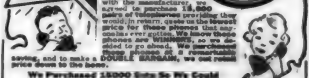

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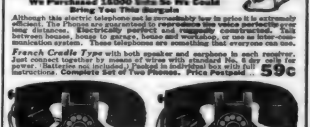

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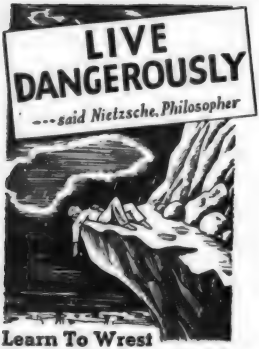
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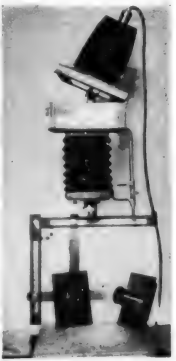
Editor's Workbench Chips

[*Continued from page 17*]

This scooter is the work of John Higginbotham. It is driven by a ⅝ horse power engine, has three speeds and will do 25 miles an hour in high. It will travel 85 miles on a gallon of gasoline.

ing on the door of the workshop with a nifty little scooter. Come right in, John, and collect your $3 award. John built his scooter of three-quarter inch pipe welded at the joints. It has a wheel base of three feet and will turn within a six-foot circle. Powered with a ⅝ horse power engine, the scooter has three speeds and will do 25 miles an hour in high. Effective brakes will stop it within twenty feet even when going at top speed. Eighty-five miles is the usual distance on a gallon of gasoline, John informs us. The tires are ten inches in diameter and two and three-quarters inches thick when inflated. They are mounted on heavy wooden rims which turn on generator bearings. The scooter has swinging foot plates, and the motor clears the ground by four inches. The cost of the entire machine, including the engine, was $15.



This photo enlarger is the work of Bruce Mowrey, who built it from plans in MI with a few innovations of his own.

• • •

Bruce Mowrey of Johnsonburg, Pa., wins $3 for the photo enlarger he built from plans in MI for March, 1938.

[*Continued on page 20*]

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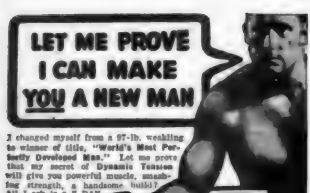

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Editor's Workbench Chips

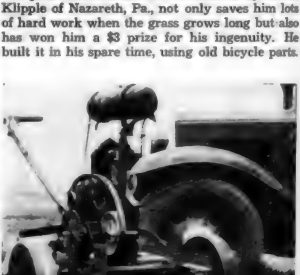
[*Continued from page 18*]

This five-foot gasoline model plane was built by Jerry Ruby. It weighs two and three quarters pounds, is powered with a one-sixth horse power engine, and is the winner of several prizes, Jerry tells us.

Jerry Ruby of Paterson, N. J., crashed the $3 class with a five foot gas model plane which is a contest prize winner. Powered with a 1/6 horse power engine, the ship takes off fast and climbs about 700 feet a minute. Fuselage and tail are made of balsa and the wing is silk covered. A neat job, Jerry!

• • •

A powered lawn mower constructed by Lester Klipple of Nazareth, Pa., not only saves him lots of hard work when the grass grows long but also has won him a $3 prize for his ingenuity. He built it in his spare time, using old bicycle parts.



Lester Klipple constructed the above powered lawn mower of old bicycle parts. An old Smith motor is the power plant, and the wheels are made from automobile brake drums.

An old Smith motor wheel furnishes the motive power. A pair of automobile brake drums were utilized for wheels. The machine has a clutch which works on a belt controlled from the handle. It looks to us as if you have a first class Workbench project, Lester.

[*Continued on page 22*]

Water Used To Cut Coal In Soviet Mine

Soviet engineers are using water instead of explosives and picks to cut coal from the seams in a newly-opened mine in the famous Donets Basin coal area, Tass, Soviet news agency, reports.

Two powerful pumps force water under a pressure of 450 pounds to the square inch or 30 atmospheres against the face of the seam at a speed of more than 250 feet a second under the control of movable hydromonitors resembling fire hose. The stream of water cuts away the coal and at the same time breaks it up into small pieces.

The coal is washed along special channels to the pit bottom, where it is drained and then raised to the surface. The water passes to a precipitation tank, where dirt and coal dust are allowed to settle, and is then delivered to a reservoir to be used again. The coal is thus both cut and hauled by water.

One hydromonitor operator can cut as much coal as 10 or 12 men working in more conventional fashion. The hydro system for coal mining was developed by a young Soviet engineer, Muchnik.

Heavy Diesel Fuels "Doped" For Better Performance

Engineers and scientists are studying the increased performance of Diesel engine fuel when it is "doped" with acetone peroxide and ethyl nitrate, it was reported to the opening session of the World Automotive Engineering Congress.

The Dutch scientists J. J. Broeze and J. O. Hinze showed that the addition of small quantities of these "dopes" makes firing of the heavy oil in airplane Diesel engines easier. The molecules of the chemical dopes are easily activated and make the combustion of the charge of fuel in the cylinders occur more easily. Aim of the investigation is to retain the safety features of a heavy Diesel fuel and yet raise its firing characteristics.

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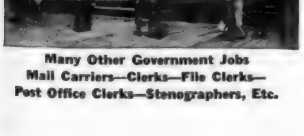

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Editor's Workbench Chips

[Continued from page 20]

This kayak, built by Michael Murray, weighs 42 pounds and cost only $7. Powered with a sail, it will carry two passengers comfortably and at a good rate of speed.

Michael Murray of Ellington, N. Y., says ideas he got from MI helped him in the building of a kayak. Well, Michael, in addition to the ideas MI is now awarding you $3 for your work. The boat weighs 42 pounds and was built at a total cost of $7 for canvas and paint. With a sail mounted forward, she will slip through the water at a rapid rate.

• • •

Lindsey L. Adams of Corsicana, Tex., takes a $3 prize with a home built racing car. Finished in cream color with red trimmings, the little auto is powered with a twin cylinder Indian motorcycle engine. It has a front wheel drive and a

[Continued on opposite page]

Lindsey Adams constructed this midget racer. It has a five foot four inch wheelbase and weighs 585 pounds. License plates cost only $1.96.

Editor's Workbench Chips

[*Continued from opposite page*]

top speed of about 70 miles an hour. A neat piece of work!

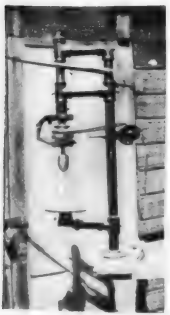
* * *

Billy Carl Tubb of Amory, Miss., gets a $3 award for a picture of the model plane he built flying high above his home town. But hold on! The ship isn't flying high, Billy tells us. It's a

The above photo by Billy Carl Tubb is a bit of trick photography. Instead of flying, the plane, which is a model, is resting on a large aerial view of a city. There was a portrait attachment on the camera.

bit of trick photography. The plane was set on a large aerial view of Amory and snapped with a portrait attachment on the camera. A swell shot, Billy!

* * *



This efficient looking drill press was made from an electric phonograph frame by Milo Nelson. The stand is made from piping spot welded at all joints.

An award of $3 goes to Milo L. Nelson of Mankato, Minn., for the drill press he constructed from an electric phonograph motor frame. The stand is made from piping spot welded at all joints to insure rigidity. The drill shaft is equipped throughout with bearings. The table can be raised, lowered or tilted for drilling at angles. Looks as if you had built a very handy machine for yourself, Milo.

[*Continued on page 24*]

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It contains full descriptions of more than thirty blueprints of interest to the handy man. The booklet was prepared by editors of MECHANIX ILLUSTRATED.

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Editor's Workbench Chips

[Continued from page 23]

James M. Calkins, Jr., constructed this midget auto from MI plans for his five-year-old son, Don, who is already an expert at handling it. The car can attain a speed of 15 miles an hour.

To James M. Calkins, Jr., goes a $3 prize for the midget auto he built from MI plans, with a few variations of his own, for his five-year-old son, Don. The front axle is pivoted in its center to avoid twisting the frame when the car goes over rough ground. The belt tightener or clutch is operated by a pedal, pressed by the boy's right foot, leaving both his hands free for steering. The hand lever operates the brakes only. Screens on both sides of the engine make for better cooling. The car will go 15 miles an hour and is easily handled by the youngster.

* * *

Russell Rieman of Gulfport, Miss., gets a $3 award for his model of the Coast Guard patrol boat Triton, which is stationed near Gulfport.

[Continued on page 26]

Minute attention to detail is the feature of this model of the U. S. Coast Guard patrol boat Triton, built by Russell Rieman. The model is 21 inches long and required over a year of spare time work to complete.

Future Air Giants May Carry Own Oil Refineries

Air giants on the skyways of the future may carry their own petroleum cracking refineries aloft, it was suggested to the American Petroleum Institute by S. D. Heron and Harold A. Beatty.

Increasingly aviation is demanding more powerful fuels, said the experts, but at the same time it is rightly asking for safer fuels which will decrease the menace of fire.

Safety fuels that ignite less easily and which burn more slowly than gasoline are the answer to this need. However, such fuels can be burned either in Diesel engines or in spark-ignition engines only after the latter are in operation.

"Engines operated on safety fuel require either gaseous or volatile liquid fuel for starting," declared the petroleum experts. Unless these starting fuels are carried with great precautions they may greatly increase the low fire risk inherent in the safety fuels. If they are carried in heavy tanks like those used in storing oxygen under pressure they add weight.

"It might be practicable to install a small electrically-heated cracking unit to crack either safety fuel or engine lubricating oil to a fixed gas (for starting)," the experts said.

"Even though such a unit were of considerable size and weight, it still would probably be lighter than special pressure tanks for volatile or gaseous fuels; and it would avoid the manufacture, distribution, and storage of special starting fuels (in event that fuels other than gasoline were used for this purpose).

"The average layman has been led to believe that the use of Diesel engines is practically a cure-all for this problem (fire hazard), but to the aircraft operator or designer the solution does not appear to be so delightfully simple," they added.

Current handicap of aircraft Diesels is that no 1,000 horsepower units have yet been seen in the United States, whereas spark-ignition engines giving 1,200 and 1,500 horsepower are commonplace and 2,000 horsepower units are now in demand, the petroleum experts concluded.

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Editor's Workbench Chips

[Continued from page 24]

Russell was assisted in the construction of his model by officers and crew of the Triton. He stuck faithfully to detail, even in his small boats, which are clinker planked like those of the original. A pretty piece of work!

• • •

A fly tying outfit is the contribution of John Carey of Warm Springs, Mont., for which we are awarding him $3. The carrying case is made from an old sample case and has ten built-in drawers for tackle, hooks, feathers, gut, etc. The

Photo at left shows John Carey's fly tying outfit, including case and vise, set up and ready for business. It is so compact it can be carried along on fishing trips. At right is a close-up of the vise.

lever which closes the jaws of the vise is beveled. The outfit is so compact it can be carried along on a fishing trip and the fly the fish are taking can be made up on the spot. Tying his own flies has saved him lots of money, John reports.

• • •

Stanley Dickinson built this photo enlarger from MI plans.

From across the big pond Stanley Dickinson of London, England, sends pictures of photo enlarger he constructed from MI plans, and we are glad to reward him with a $3 prize. A variation of his is to use a camera in place of a bellows and vena. Enlargements larger than 13x10

[Continued on opposite page]

Editor's Workbench Chips

[*Continued from opposite page*]

can be made by reversing the lamp house on the column. That the enlarger works very well can be seen from the accompanying photo, which was the first enlargement made.

• • •

We are sending R. H. Statham of Phenix, Ala., a $3 award for the auto trailer he built from MI plans. It has an all welded steel sub-frame and

This trailer was constructed from MI plans by R. H. Statham at a cost of about $45 for materials. It weighs about 1,250 pounds and tows smoothly behind a Ford V-8.

a special welded axle. It weighs 1,250 pounds and pulls well behind a V-8 Ford. The total cost was about $45, not including labor. Good enough!

• • •

James Izydore of Duquesne, Pa., constructed a scale model of Major Al Williams' Gulfhawk, which is worthy of a $3 prize. The plane has a wing spread of 28 inches and is complete in every detail, including retractable landing gear and tail wheel, controls movable from cockpit and

James Izydore paid painstaking attention to detail in constructing this model of Al Williams' Gulfhawk. The motor alone is fitted together from approximately 1,000 separate pieces.

sliding hatch. The motor contains approximately 1,000 pieces which have been fitted together. Looks like a mighty nice job, James.

See you next month—*The Editor.*

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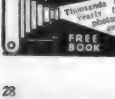


FREE BOOK

The Editor Is Told

Continuing with the policy we inaugurated last month, we give below excerpts from letters received from readers, enthusiastic and otherwise, of MI, together with appropriate comments by the editor. So whether you want to give the magazine a pat on the back or a kick in the trousers, let us hear from you. If you readers don't write us, we have no way of knowing how you feel. Let's go!

Dear Editor:

I want to tell you how much I enjoy the clear, interesting style of your articles. In most magazines of your type the tendency is to give too technical a description for the average layman. That is not the case with MECHANIX ILLUSTRATED, however. Your articles are understandable by anyone, whether or not he has a wide knowledge of the subject.

H. G., Chatham, N. Y.

• • •

Thanks, H. G. We try to make our features easy reading which will appeal to all. We are glad to know we have succeeded.

• • •

And now, going back to the pile of letters on the desk, we find two which look interesting. One says, in part:

"The trouble with MECHANIX ILLUSTRATED is too much photography. Why don't you cut down on the photography and devote the space to other subjects?"

The other says:

"I would like to see MECHANIX ILLUSTRATED publish a few more photography articles."

Couldn't you two fellows get together and thrash this thing out?

• • •

Dear Editor:

I am exceedingly interested in boat building and boating and would like to see more articles on these subjects. I enjoyed particularly "So You're Buying A Boat!" by Roland Cueva, which appeared in your March issue.

C. D., Norfolk, Conn.

• • •

We will speak to Mr. Cueva about that, as he is a member of our editorial staff.

• • •

Dear Editor:

That article, "The Secret Of Plastics," was swell! Let's have lots more like it. Other writers I enjoy in your magazine are Murray, Beard, Sibley, Carrington and Gerstin.

Your model plane stuff is good, too, though I would like to see more of it. I am also interested

[*Continued on opposite page*]

The Editor Is Told

[*Continued from opposite page*]

in auto racing and think a lot of others like that branch of sport.

J. Z., Pocatello, Idaho.

* * *

Glad you like the model plane articles, J. Z., because we are going to run more of them.

* * *

Dear Editor:

Lots of your projects are all very well if a guy is filthy with money, but how about us poor fellows who can't afford an elaborate workshop? Why not run more inexpensive projects—woodworking projects, for instance, which require only simple tools. I am sure you would please lots of your readers if you did this.

J. H. L., Sapulpa, Okla.

* * *

We agree with you about the expense, J. H. L., but we think if you will go through an issue of MI carefully, you will find lots of inexpensive projects.

* * *

Among the many letters we have received are requests for articles on radio, microscopes, chemistry, hobbies, etc. In short almost everyone wants us to specialize on his particular interest. Have a heart, boys. We have thousands and thousands of readers, and to go into extensive detail on everything in which all are interested would fill a large size encyclopedia, if not library. We try to stagger our subjects, so everybody will be pleased, but we can't go into minute detail on everybody's pet hobby every month.

* * *

Dear Editor:

I am an enthusiastic reader of MECHANIX ILLUSTRATED and get a kick out of just about everything in the magazine. One of the best departments, I think, is the Editor's Workbench Chips, which gives us readers an open forum in which to exhibit what we are able to do. I haven't managed to knock down an award as yet, but I am hoping to do so soon.

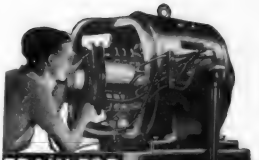
R. L., Dorset, Vt.

* * *

Keep at it, R. L., and we're sure you'll find a $3 check, if not one for $5, in your mail one of these days.

Well, here we are at the end of the page, and though we hate to put aside the rest of the letters you readers have written us, we're afraid we'll have to do it for another month. But don't forget! Write us and let us know what you think of us, whether it's bad or good.

Good-bye now—*The Editor.*



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French Streamlined Auto Goes 53 Miles On Gallon

France now has a light-weight motor car which can do 53 miles to the gallon of gasoline when running at 30 miles per hour, it was reported to the World Automotive Engineering Congress by French engineers J. Andreau and Charles B. Brull.

At 50 miles an hour it will get 49 miles to the gallon of fuel and 39 miles to the gallon at 70 miles per hour. Even at speeds of 90 miles an hour it obtains 27 miles to the gallon of fuel.

This car, a streamlined version of the popular Citroen, seats five people and has a top speed of 93.5 miles an hour. Compared with a stock car having the same motor the streamliner's performance showed half the gasoline consumption coupled with a 45 per cent increase in speed.

Engineer Andreau is the designer who turned out the body of the famous "Thunderbolt" of Captain Eyston which holds the world's land speed record of 357.5 miles an hour.

In cars with the new Andreau body, the hissing of the wind against the body is completely suppressed, said Mr. Brull, and the driver loses this criterion of speed.

So efficient is the streamlining that the windshield remains completely clear. There is no frontal air pressure upon it to stick mud or insects to the glass panels. Rain drops run from the bottom to the top of the windshield and are instantly scattered so that no wiper is needed.

With this streamlining there is no sidesway due to lateral wind and the stability is so great that the steering wheel has true finger tip control.

The economies achieved with such streamlining, even at ordinary driving speeds, are the engineers' answer in Europe to the severe taxes on motor fuel and cars.

Gentle Rains Do Share Of Harm To The Land

Gentle rains are usually thought of as friends of the soil, in contrast to the heavy, slashing, "gully-washer" type of downpours, yet they also do their share of harm to the land in the Piedmont region of the East and Southeast, declare scientists in the U. S. Soil Conservation Service.

The gentle rains soak in, soften the soil, and where gullies have already been cut, the edges and sides crumble and slump off. If this debris were left to lie and become grassgrown, it would not be so bad. But then come the heavy rains, the "gully-washers." They scour the gully bottoms clean, leaving these gashes in the earth wider year by year.

The cure prescribed: check-dams, planting of grass, bushes and trees, field terraces that follow contour lines and intersect the water's precipitate lines of flow.

Rotary Electric Ironers Restore Damaged Documents

There are certain wrinkles in the nation's past which are sorely in need of ironing-out, and at the National Archives, in Washington, D. C., a solution has been found which involves neither red tape nor acts of Congress, but the familiar household electric ironer. In this central repository of documents the ironer has become essential equipment for rehabilitating papers which have been damaged by water or which have simply faded and become wrinkled with age.

Rotary type electric ironers were first used on such a job during the time of the Ohio River Valley floods of 1937, when thousands of city, county, state, and federal records were left in a water-soaked condition. It was found that the household electric ironer, simultaneously applying heat and pressure, dried out the documents completely, removed wrinkles, and restored the faded inks into sharpness. A surprising discovery was that the ironer often made the writing or printing on the records sharper and more legible than it had been prior to the flood damage.

The successful use of ironers in the Ohio Valley suggested the use in Washington. Experiments proved their value in restoring aged historical documents, many of them priceless records of the nation.

Last September, when New England was swept by the hurricane, emergency calls were issued for ironers to save and restore documents. At Providence, R. I., after the waters had subsided, banks and home owners discovered that millions of dollars' worth of negotiable securities and currency were soaked and muddy, as were wills, contracts, and other papers in safety deposit boxes. Every available ironer in Providence was commandeered.

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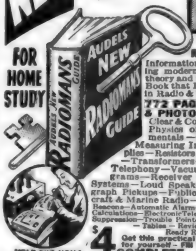

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International Struggle For Beryllium Industry

A no-quarter-asked-or-given international struggle during the next few years among a dozen industrial titans in three countries will usher in a new "miracle metal," beryllium, which promises to remake industry from top to bottom within a decade and already has inconceivably valuable, nearly-realized military use.

Reading more like an Edgar Wallace novel than a story of orderly industrial development, the battle for control of the metal and the accompanying riches has employed nearly every weapon in the financial arsenal.

Highly secret documents in New York and Berlin have mysteriously become known to a British financier. English government pressure has broken a vital contract. A powerful German concern has concealed its ownership of American patents through the use of an American company to secure them. A shadowy but persistent effort emanating from German sources has been made to discourage American development of the "miracle metal."

These episodes have been revealed in testimony of the Temporary National Economic Committee as it seeks to unravel the story surrounding the metal which is one-third lighter than aluminum and, in alloyed form, has properties so remarkable as to make experienced metallurgists gasp. Past events foreshadow more to come.

When alloyed in the proportion of 2 per cent of beryllium and 98 per cent nickel, an alloy three times as strong as stainless steel is produced. When mixed in the same proportions with copper, beryllium produces a copper alloy nearly twice as strong as stainless steel.

A watch made of the two alloys was once dropped 3,000 feet from an airplane. When found, it was still running; only the crystal had been broken.

Springs made of phosphor bronze break from fatigue after being flexed 300,000 times in a testing machine. Stainless steel springs can stand 2,000,000 flexes. The engineers finally stopped the machine with a beryllium nickel spring under test, after 15,000,000,000 times, and the spring was still good.

The three nations involved are Germany, where the first development work on a large scale was carried out; England, with no productive facilities of her own but grimly determined that she shall

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Here in this country are several companies all struggling for a place and one of them, the Beryllium Corporation, is openly stating through its president, Andrew Gahagan, that it hopes to get control of the entire field in the United States.

Until a year ago, the giant German electrical firm, Siemens-Halske A. G., and the Beryllium Corporation had the world secretly and neatly partitioned between them, on the basis of patents they described as essential. Patents were pooled. Siemens-Halske had Europe as its sales apple, with the Americas reserved to the Beryllium Corporation.

But that arrangement has been shifted somewhat since then by a lightning move which is only one episode in this struggle.

One day in the summer of 1938, just before he was to leave on one of his frequent visits to the Siemens-Halske people, Mr. Gahagan was asked by one of his directors to look up an English stockholder. Surprised, since he had believed all the stockholders were American, he was then flatly told by the director that he had better look up this English stockholder, for whom the director had purchased a large block of stock.

The Englishman turned out to be chairman of the board of Vickers, Ltd., giant English arms firm. When Mr. Gahagan met him, the Vickers mogul informed him of all terms of the highly secret agreement between Mr. Gahagan and Siemens-Halske, and told him to never mind how he found out. Under its terms, England would have to purchase her beryllium from Germany.

"You're going to modify that contract," the Vickers chairman ordered, "because England cannot be dependent on Germany for anything of military importance."

Mr. Gahagan protested that a contract is sacred. "Well, I'll take care of that," was the reply.

A few weeks later, Mr. Gahagan was approached while in Germany by two British representatives. A conference with Siemens-Halske was arranged. Then the determined British pulled their trump card—they threatened to confiscate the English beryllium patents of both companies. The agreement was changed. England is now part of the American concern's sales territory.

But that is scarcely one chapter in a history which will in five years make a long and thrilling, but literally true, tale of international intrigue and double-dealing, as well as of science, as men fight for control of riches taken out of the earth by scientists.

Modern chemists say Tyrian purple was inferior to modern dyes, yet 1,600 years ago wool dyed with Tyrian purple brought $350 a pound.

German chemists have produced a substitute for the tin can—a container of transparent plastic with top and bottom of tin.

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W. H. FAWCETT
Publisher

Vol. XXII
No. 4

August
1939

Sailplane Magic

by Richard C. du Pont

America's Outstanding Sailplane Authority
President, Soaring Society of America, Inc.

Richard du Pont, America's former distance and altitude soaring champion and two-time winner of the National Soaring meet at Elmira, N. Y., begins the first of a series of three exclusive articles on the thrilling sport of gliding and soaring. Floating through the air in planes without power is a little known, fascinating story of aeronautical magic.

HOW would you like to fly into the clouds on a magic carpet? It's being done—not on a carpet, exactly, but in a graceful, motorless sailplane which is modern man's interpretation of the Arabian tale of the magic rug! We call it soaring.

For more than 30 years men have been gliding and soaring in planes without power. They learned to fly across valleys and mountains, to follow rivers and float out over the ocean, steal a ride on a cloud or circle over one spot like a bird.

Soaring is fun! It's the most fascinating, thrilling sensation that it may be your good

Richard du Pont is shown standing beside his glider which he flew in the Elmira soaring meet in 1936. The sailplane shown at top, has a tremendous wing spread; actually floats on air; is as graceful as a bird.

Orville Wright made the first really long duration flight at Kitty Hawk, N. C., in 1911. His time was 9 minutes, 45 seconds! Today's record is 36 hours, 34 minutes. Below: Now anyone can glide. England's youngest is 10-year-old John Aspell, who must add weight to his glider to hold it down.

rtune to enjoy. The best part about it is at soaring is a sport whose popularity is aring! Almost anyone can take it up. aring fans today usually unite into a club, are the cost of a glider or sailplane and us pursue the sport at minimum expense. ere are more than 100 soaring clubs roughout the country with a rapidly grow-ing membership. So you, too, can join the growing numbers defying the laws of gravitation in a sailplane.

Exactly what is this sport? How did it come about?

To understand the amazing development of soaring, let's look back to the pioneer fliers, the Wright brothers, for example, and Lilienthal who made his first aerial dash in a glider in 1881. These men built successful gliders with artificial helms; controlled them by shifting the weight of the pilot's body while in flight.

In 1900 the Wright brothers became active in aviation and built several successful gliders of their own. It was during their successful, historic flights at Kitty Hawk, N. C., in 1909 that they established a glider record. Orville was at the controls. He took off in a strong wind, turned inland over the hills and flew into the west, remaining in the air for nine minutes and forty-five seconds!

Orville proved that man was beginning to share birds' knowledge about the air. Orville found that air will support him as water supports the swimmer if he will but handle his glider wings as soaring birds handle theirs.

How birds use air currents and what flyers learn from them is revealed in an odd experience related by Major Van Tschudi, a German aviator. Cruising in a balloon he saw far below him and off to one side a flock of storks soaring along. Suddenly to his amazement they rose almost vertically without a flap of their wings.

Soon they passed the elevation at which

Above: Primary gliders start from the top of a hill and glide down; are used to familiarize the pilot with the controls. The glide is thrilling no matter how low the altitude. Below: Note the underside of a sailplane's wing with its terrific spread and long aileron section.

the balloon was flying and went on up far above him. While he was still wondering at this marvel his balloon which had been traveling horizontally reached the point where the storks started upward. Then the balloon, too, began to rise rapidly. It had struck one of those vertical air currents and was taking a free ride up to a higher altitude.

But a glider or sailplane can't leave the ground as the bird does. How, then, does a motorless plane get up into the air swiftly, let alone stay there? This little trick is accomplished in any one of four ways. An automobile may tow the glider, which rises into the air like a kite. At an altitude of about 500 feet the pilot trips the catch and drops the tow-rope.

Another method involves the use of a shock-cord, which is a rope composed of hundreds of strands of live rubber. The cord is stretched in a V, with the apex attached to the nose of the ship. Men holding the ends of the V walk forward, stretching the cord, and when the ship starts to move they run as fast as they can. The plane is literally shot into the air from the giant sling.

In winch launching an automobile motor drives a winch, which winds up a tow rope, pulling the glider or sailplane along the runway and into the air.

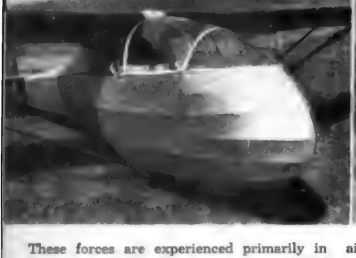
Another method is for an airplane to tow the glider aloft and then cut loose.

For their ability to stay aloft, sailplanes depend upon the very forces of nature which are usually a hindrance to powered planes.

Sailplanes are catapulted into the air instead of dragged, as gliders are. This stunt is accomplished by attaching a live rubber rope to the plane and stretching it taut with the result that the sailplane is shot into the air as from a sling.

Below left: The utility glider has a covered fuselage; is a combination glider and soarer.

Below: Cockpit view of a utility glider showing altitude, air-speed and turn and bank meters. Note design of stick.



These forces are experienced primarily in slope soaring. In slope soaring, the pilot of the motorless plane depends upon the up-current of air which results when a moving mass of air is forced upward by a hill. Hilly country is, of course, essential for this type of flying.

Thermal soaring utilizes up-currents due to differences in atmospheric temperature. For example, a wheat field or other light colored area of ground reflects the sun's rays and consequently, there is an up-current of warm air. On the other hand, dark areas such as plowed fields absorb the sun's rays and do not reflect them. Over such areas there may be down currents. When air conditions are unfavorable "thermal columns" of hot air leave the earth and slowly rise to the condensation level, where the presence of this convection column is indicated by a cumulus cloud. In order to make full use of the lifting air, the flyer must stay within this column by circling it.

In storm soaring the steadily rising air, over a large area as a storm approaches, provides good lift for distant flights. If the flyer goes into the storm he usually attains fantastic heights in the thunderhead, but he risks the loss of his ship because of the violent gusts.

Riding the cold front of a thunder storm is dangerous business. The trick is to stay just ahead of it. There is frightful danger if the pilot lets himself get caught in the midst of it, for the inside of a thunder storm is a raging combination of violent gusts, pelting hail, and terrific bolts of lightning.

One sailplane flown by the Austrian Kronfeld, landed in safety, but his sailplane was riddled by hail as if it had been exposed to machine gun fire. Others have had their wings torn off. One sailplane pilot reported

A conventional method for launching a glider is by auto as shown at right. In such cases, the auto needs a long and level field. After the glider attains altitude the tow-rope is dropped.

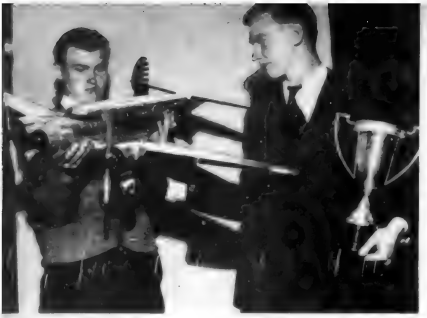
that he was caught in the front part of a thunder storm over the state of New Jersey. Before he knew it he had gained 4,000 feet. In a desperate effort to get down he dived at one hundred miles an hour—and still he was going up! On the other hand, had he been caught in the back part of the storm he would have been in a zone of terrific down-currents.

Men who fly these planes without motors make a fine distinction between what they call a glider and a sailplane. During a glide a plane steadily loses altitude until it lands. On the contrary, a sailplane is one in which the machine, while pointing downward, is lifted by upward air currents and thus either maintains or increases altitude.

In fact, there are three types of motorless planes. These are known as the primary, the utility, and the sailplane. The primary glider is the open type. Its frame work, constructed with no attempt at streamlining, is built of either steel tubing or wood, with its wings covered with fabric and supported by wires. They are primarily used for training in which the novice is towed a few feet off the ground while he familiarizes himself with the controls.

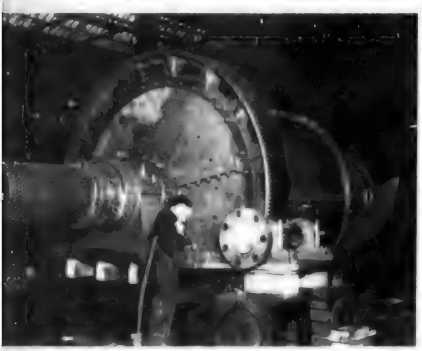
The utility glider is a covered craft and is used primarily for training as well as soaring. It has a covered fuselage, wings braced by

[*Continued on page* 112]



Make Flying Model Of New Army Plane

A MODEL of the Army's new stratosphere experimental plane was built by Casimir and Zenon Struzyna for exhibition at the third annual exposition of the Central Gas Modelplane Society in Chicago. A flying model, the plane was built to scale, something not common in flying models. It weighs six pounds and is powered by two small gasoline engines. The Struzynas took two months to complete their project.

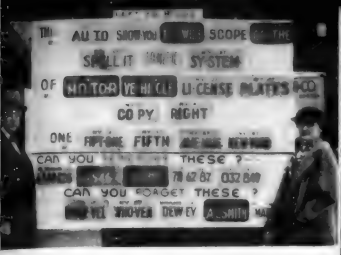


51,000-Pound Cargo Transported By Air

A GRINDING mill weighing 51,000 pounds, to be used for grinding gold bearing ore, was carried by plane part of the distance from Milwaukee to a gold mine in the wild interior of Nicaragua. Designed in sections to be flown in from the port of entry, each piece was kept under 4,200 pounds when possible and none was allowed to weigh over 5,000 pounds. The assembled continuous tooth, herring bone driving gear measures more than eleven feet in diameter.

Bomb Extinguishes Blazing Gasoline

THE fire department of Paris, during recent tests, tried out a new bomb to extinguish flames in a tank of blazing gasoline. The bomb, which was designed for use in air raids, explodes at a temperature of 135 degrees. When it explodes, it exhausts the supply of oxygen in the surrounding air, which causes the most furiously burning flames to subside quickly.



Invents License System

THE Spell-It or Co-ro-na system for license plates is the invention of Walter W. Hinton, who is trying to get motor vehicle authorities of several states to adopt it. Words or syllables would be more easily remembered than numbers, he claims, and thus hit-and-run drivers would be curbed and detection of criminals made simpler.

Tricycle Landing Gear On Army Plane

A TRICYCLE landing gear is an unusual feature of the new Bell P-39 pursuit plane of the Army Air Corps. It guards against nosing over when landing in muddy fields or when using brakes in small fields, on which landings would be made in actual warfare. The gear is retractable in flight. A 1,000 horse power Allison engine, super-charged to carry the plane to exceptionally high altitudes, is the power plant of this speedy fighter.

Motor Torpedo Boat Fastest Of Its Type

A BRITISH motor torpedo boat, 70 feet long and driven by three 1,000 horse power Rolls-Royce engines, has the smallest target silhouette and fastest attack of any boat of her type afloat. Torpedoes, two anti-aircraft gun turrets, armor piercing gun, depth charges and smoke screen apparatus comprise her armament.

Unusual Architecture Adds Charm To Fair

UNUSUAL architecture contributes charm to the San Francisco World's Fair. At the left is the high-piled elephant tower. Above, the 80-foot colossal of Pacifica, theme statue of the exposition, towers high over the tiny human figure in the foreground.

Automobiles Coast Up Magnetic Hill

MAGNETIC Hill near Moncton, New Brunswick, looks like an ordinary hill. But stop your car near the white post, release the brakes and disengage the gears, and you will immediately start to coast up the hill! Even water in the ditches runs uphill. At first thought to possess some strange magnetic force, the hill is now believed to be a natural optical illusion, since a compass acts normally in its vicinity.

Racket Takes Racket From Table Tennis

A SILENT racket for table tennis is the invention of Kenneth Moen, tenth ranking table tennis player of Minnesota. Strung with piano wire coated with liquid rubber, it gives no sound at the impact of the ball. Frame and handle are of one piece of aluminum, and handle is leather covered. The racket is said to be 25 per cent faster than the ordinary paddle.

Signpost Directs Aviators

A UNIQUE signpost, located at the airport at Amsterdam, Holland, shows aviators the direction of practically every city of importance in Europe.

Dishes Protected Aboard Submarine

THE ticklish problem of keeping the crockery from breakage during heavy weather has been solved aboard Uncle Sam's new submarine, the Saury. Dishes are stowed in special bins which stop them from sliding around. The galley, made of stainless steel, is one of the smallest of its kind although it feeds 64 men.

He Potted Plants

Cutting cash from cactus was this inventor's first idea. The Legion went for these potted plants; started Wilson in business. Right: View of shop.

MONEY may not grow on trees, but Lester Wilson's invention made it grow from flower pots!

The idea was simple. He merely obtained 100 tiny flower pots. Then he collected a few pounds of old baling wire. This he hammered and fashioned into "wrought iron" stands. Then he harvested 100 diminutive cactus plants from a neighbor's garden. He planted a cactus in each of the flower pots and fared forth to see what sales success he would have with his unique floral offering.

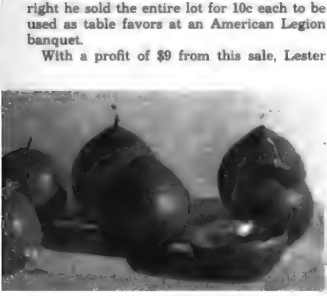
The result seemed almost miraculous! Outright he sold the entire lot for 10c each to be used as table favors at an American Legion banquet.

With a profit of $9 from this sale, Lester Wilson of San Gabriel, Calif., who had been unemployed up to this time, set out to buy more flower pots. He gathered more cactus; hand hammered yards and yards of baling wire. He boosted the price of his potted cacti to 25c each; upped his profits to $24 per hundred. Still he couldn't turn them out fast enough to meet the demand.

In a short time he had his own cactus garden; was buying baling wire in 100-lb. rolls and selling his potted cactus plants by the thousands!

Convinced that he knew what people wanted, and that he could give it to them, Wilson rented a vacant store room within the morning shadow of California's famous, old Mission San Gabriel, bought a few small cans of bright-colored paint from the dime store and began applying it to miscellaneous gourds, seed pods and ears of dried, Indian corn.

For 25c, a "charm string," assembled on a length of Mexican, hand-woven, hennequin cord was offered to the hordes of tourists who swarm around Mission San Gabriel. And they



Wilson invented and patented a method for converting oranges into ornamental candles which burn with a fragrant aroma. They cost a few cents; sell for a quarter.

for Profit

by JOHN EDWIN HOGG

Here's an idea that's making a bloomin' millionaire of once-unemployed Lester Wilson, who invented and patented several interesting methods for pinching profits from ordinary plants.

Above: The "charm string" is made with painted gourds, seed pods and corn; costs 5c and sells for 25c. Left: Scene in a corner of El Pintado's yard with Lester Wilson standing amidst his gourds, seed pods and corn.

bought this newest offering by the tens of thousands. Everybody, it seemed, wanted painted gourds, lacquered seed pods and varnished corn finished in colors such as autumn in New England was never known to produce.

Soon added to Wilson's stock in trade were crooked-necked gourds painted black and white to look like penguins; dragon-like snakes, hand-carved, glass-eyed, peg-fanged and painted from the steamed and bent flower stalks of the pithy, desert yucca; ever-lasting bouquets of artificial flowers made by gilding, bronzing or painting the dried seed pods and stems of the Chinese water lotus, which grows in great profusion on California frog farms; strings of chili peppers; bunches of multi-hued, Indian corn . . . and even household gongs, made by applying paint and a few lengths of brass chain to old automobile brake drums.

Today Lester Wilson's establishment "El Pintado" (The Paint Shop), is known to an estimated 2,000,000 Americans who have visited it from every state in the Union. It spreads over a 200-foot frontage upon San Gabriel's Santa Anita Avenue and Mission Road. Its wholesale and retail business requires 4,000 square feet of floor space and half an acre of storage yards.

A 10-acre farm in the fertile San Gabriel Valley grows thousands of assorted gourds that "Les" Wilson decorates and sells each year. A sizable forest of camphor, eucalyptus and other trees and shrubs furnishes the millions of pods that annually find their way into El Pintado's commercial output.

During busy seasons El Pintado furnishes employment to as many as 25 artisans, clerks and sales people, while throughout the year a

[*Continued on page* 114]

Pin cushions made from slices of yucca stalk are selling by the thousands, wholesale and retail. Wilson employs artists at his El Pintado shop to paint the designs.

Builds House For Banana Tree

TO PROTECT from the weather a 20-foot banana tree a friend had given him, John F. Pitts of Fayetteville, Tenn., built a special house. Its interior is heated by electric light bulbs, which keep the temperature over 40 degrees.

Cycle Riders Jump Obstacle

BRITISH military dispatch riders aren't afraid of such little things as breaks in the road. Two of them are shown in the above photo, taking such an obstacle in easy stride on their machines.

Quick Change Motorbicycle

A NOVEL bicycle with three wheels and a motor combines business with pleasure. By adding a box to the front frame, a delivery machine is obtained. For pleasure riding the two front wheels and frame can be easily removed and a wheel the same size as the rear wheel quickly attached. The power plant of the motorbicycle weighs only 27 pounds. It burns fuel oil and gasoline and will drive the machine at a top speed of fifty miles an hour. The rate of fuel consumption is from 100 to 140 miles to a gallon.

New Type Bearings Decrease Friction

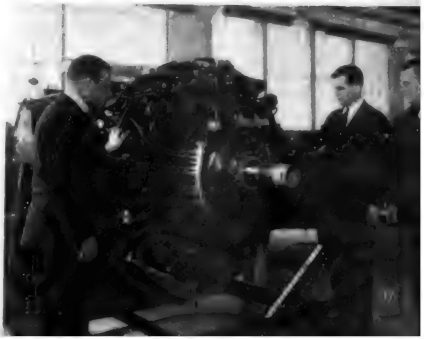
CAN a man pull a railroad car? The answer is: Yes —if it's equipped with the new tapered roller bearings, which almost eliminate friction. Charles Atlas, well-known strong man, recently gave an impressive demonstration of the easy action of this type of bearing when he pulled the 145,000-pound observation car of the Pennsylvania Railroad's Broadway Limited a distance of 100 feet. These bearings are rapidly replacing the old type for railroad use.

Coast Guardsmen Test Rescue Boat

THE U. S. Coast Guard recently tested a ten-foot boat, which resembles a torpedo, as a new means of getting a life line to a vessel in distress. The boat is propelled by battery powered electric motors and is controlled by a cable which stretches from it to the shore. Named the *Rice Runner*, the boat will carry ropes to sinking ships that are too far off shore to be reached by the present method of shooting a line.

Most Powerful Plane Engine Is Developed

THE Wright Duplex-Cyclone, with a rating of 2,000 horse power, has taken the lead as the world's largest and most powerful air-cooled aircraft engine. It is a radial type engine with its 18 cylinders arranged in two rows of nine cylinders each. The new power plant was developed secretly, with the aid of Army Air Corps engineers, for larger and faster commercial and military planes.



Robot Secretary Takes Letters

Immediately after the robot secretary takes a letter it can be played back for transcription on the typewriter. Or the message may be filed away and not typed for years.

by George A. Posner

TWENTY years a-borning and covered by 52 patents is an invention finally perfected by a Hollywod concern. It is a robot private secretary that takes dictation, writes letters that talk, records business deals and conferences, spies on suspects, reads the boss to sleep or tells him all about a radio broadcast he may have missed! And when the office is closed for the day, it will take after-office-hours calls or yell for help when a window or door is disturbed.

[*Continued on page* 116]

Above: A message is taken from the robot and placed in an envelope for mailing. A record of 7,800 words may be mailed for three cents. Right: Robot records a business conference.

Home-Made Airplane Has Unusual Design

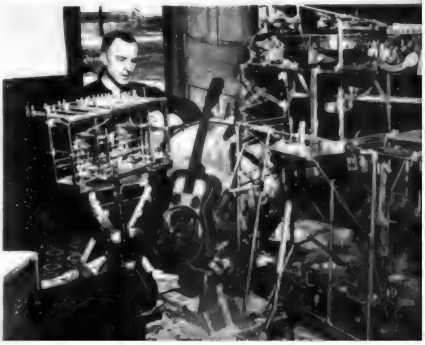
A HOME-MADE airplane of unusual design was built by Saleh Helmy, an Egyptian medical student, for a trip from England to Alexandria, Egypt. The plane is a low wing cabin monoplane. From nose to tail it is only 18 feet long, while measuring 26 feet between the wing tips. The engines are a radical feature. Instead of using one fairly powerful engine, three engines of only 25 horsepower each furnish the motive force.

Picture Instructs Parachute Jumpers

THIS is not a photo of an entire air force bailing out. It is a composite picture published in the official Italian government aviation magazine to teach student aviators the finer points of parachute jumping. The rather weird movements of a parachute jumper in mid-air are illustrated, aiding students to learn how to control their positions during a descent. Parachutes have been eliminated in order to simplify the photo.

Has One-Man Band Of Fourteen Pieces

ELMER TRUDGEN, 26-year-old Canadian, recently completed the mechanism which enabled him to add a banjo to his one-man band, increasing it from 13 to 14 pieces. Trudgen's hobby, on which he has been working for six years, includes, besides the banjo, a piano, violin, guitar, harmonica, two drums, two triangles, two sets of bones, a cowbell, chimes and a cymbal.



Radio Buoy Bares

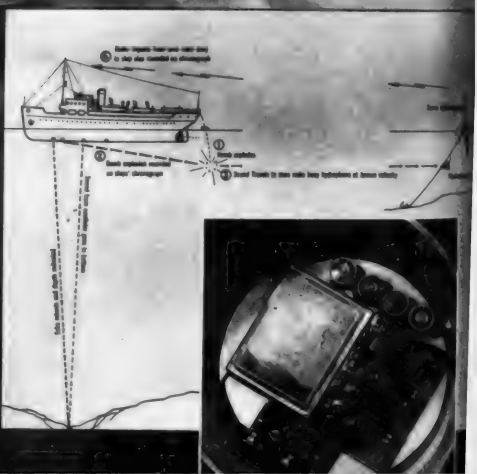
Twenty depth-soundings a second is the achievement of a new radio buoy in use by our survey ships to chart treacherous ocean bottoms.

[illegible] robot to Uncle Sam's rapidly growing [illegible] list of mechanical men in Washington. He's an automatic announcer or radio broadcaster who offers [illegible] messages in the interests of navigation safety while sealed in an airtight container inside a buoy bobbing up and down on the waves.

More specifically, this newest Mr. Robot is able to help the navigator of an ocean-going vessel steer clear of hazardous rocks or other undersea projections that constitute an ever-present menace to navigation. He's a major cog in the remarkable new equipment just developed by the U. S. Coast & Geodetic Survey for charting the ocean's floor and making it safe for commercial and passenger shipping.

Dr. Herbert Grove Dorsey, principal engineer of the U. S. Coast & Geodetic Survey, and inventor of the sea-going radio equipment says:

"My invention, known as a sono radio buoy, is an automatic transmitting station sealed inside an airtight



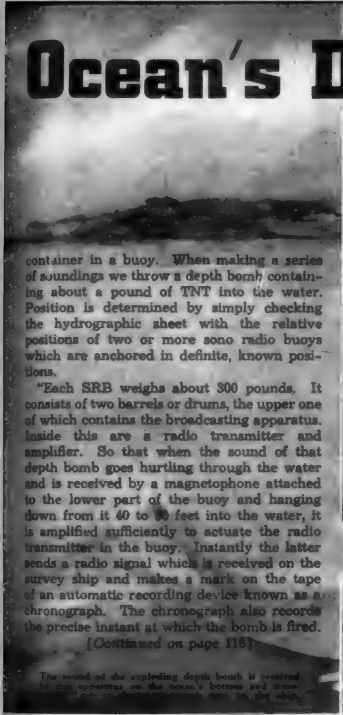
Right—Striking visualization of how the new sono radio buoy cooperates with the echo sounding device on board a Coast & Geodetic Survey ship to locate the depth of the ocean at any given point, [illegible] for marking [illegible]. The view of the dry-cell batteries was taken looking down into the drum which is a part of the radio buoy. This equipment consists of an amplifier and transmitter [illegible] batteries, 8 dry cells

Ocean's Depth

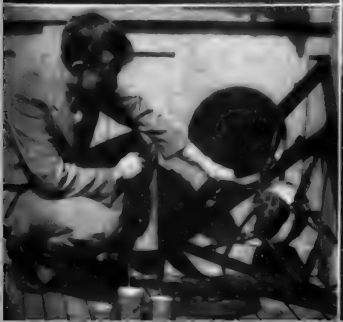
container in a buoy. When making a series of soundings we throw a depth bomb containing about a pound of TNT into the water. Position is determined by simply checking the hydrographic sheet with the relative positions of two or more sono radio buoys which are anchored in definite, known positions.

"Each SRB weighs about 300 pounds. It consists of two barrels or drums, the upper one of which contains the broadcasting apparatus. Inside this are a radio transmitter and amplifier. So that when the sound of that depth bomb goes hurtling through the water and is received by a magnetophone attached to the lower part of the buoy and hanging down from it 40 to 50 feet into the water, it is amplified sufficiently to actuate the radio transmitter in the buoy. Instantly the latter sends a radio signal which is received on the survey ship and makes a mark on the tape of an automatic recording device known as a chronograph. The chronograph also records the precise instant at which the bomb is fired.

[Continued on page 116]



The sound of the exploding depth bomb is received by the apparatus on the ocean's bottom and transmitted by radio to a receiving set on the ship.



Above: Lowering the radio buoy into the ocean. Below: Can from TNT bomb with 10 to 20 second fuse is used in connection with the radio buoy.

Shibe Park World's Best Lighted Ball Field

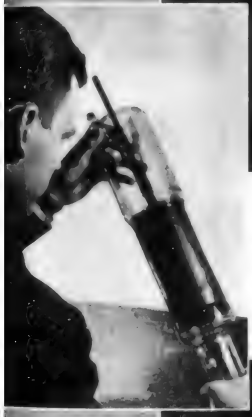
CONNIE MACK'S lowly Athletics can claim one title! Shibe Park, Philadelphia, with its new two billion candlepower floodlighting system for night baseball, is now the world's best lighted ball field. Comprising 780 floodlights of 1,500-watt capacity each, the plant is of sufficient intensity to provide light for 2,000 homes or to make newspapers readable at a distance of 175 miles if all the lights were concentrated in a single unit, yet there is no glare and resulting eye strain for either spectators or players. The lights are mounted on eight steel towers surrounding the park, with the top rows of lights 155 feet above the ground. . Twenty-inch reflectors increase the brilliance.

Auto Driving Skill Tested By Machine

A FOOL proof machine tests auto driving ability. Electrically driven, it has all the gadgets found in a real car, plus a stop watch device for recording reactions to unexpected hazards. A model piece of road, painted on a canvas belt, moves in front of the driver at varying speeds. Unexpected hazards are produced by a red light flashing on. Reactions are noted on a paper tape.

New Alloy Guards Vacuum

Molten Kovar leaving an electric induction furnace to be cast as an ingot, before being made into metal seals for glass. Kovar must be melted more accurately than any other marketed alloy.



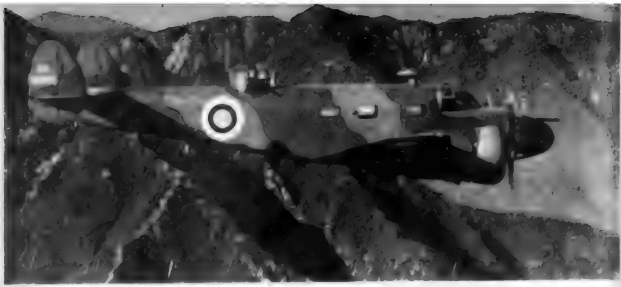
Typical of Kovar's application is this metallic seal formed with the two glass ends of an ignitron tube. Because of its ability to form perfect seals with glass, Kovar has made possible the manufacture of radio transmitter tubes which are 10 times more powerful than any built 15 years ago.

Kovar ingots weighing 250 pounds are heated in a furnace before being pounded into hardness by forging hammers.

"KOVAR" may sound to the reader like the name of a Pullman car—and maybe it is—but to the electrical world, Kovar is the name of one of the newest and most valuable metal alloys known to man.

Kovar is a stranger to the public because it does its work behind the scenes in the multi-formed vacuum tubes upon which depend the efficient electrical operations of the world's transportation and communication systems.

[*Continued on page 115*]



Air Fighter Camouflaged

THE Lockheed 212 fighter, when treated to a coat of camouflage, blends nicely against the mountain background of California. One of these speedy ships, manned by a crew of four, recently made a 25,000-mile good will flight through 15 countries of Central and South America.

Gate Insures Fair Start

A NEW type starting gate, tried out by the Hollywood, Calif., Turf Club, insures an even getaway for the ponies. The starter presses an electric button which rings a bell and at the same time opens the gates. A bar in the rear of the stall prevents the horse from backing out.

Foreign Built Cycle Weighs 110 Pounds

A FOREIGN built motorcycle, fully equipped with three-speed gear, kick starter and flywheel magneto, weighs only 110 pounds. It has a top speed of 53 miles an hour and will do better than 140 miles on a gallon of gasoline.

Flowers Turned To Gold

LITERALLY turning flowers to gold, a Los Angeles dentist, Dr. J. Walter Gray, makes a hobby of moulding unique and attractive jewelry with the aid of the standard apparatus used for casting gold inlays. So perfect are his golden flowers that they retain all of the fine veining and markings which the petals possessed before they were vaporized at a temperature of 2,000 degrees.

Because of the natural flexibility of the process of casting dental inlays, any small flower or leaf can be reproduced by this method. Among those turned to gold by Dr. Gray are daisies, dandelions, grass blades, buttercups, and four leaf clovers. Many of the four leaf clovers have been transformed into golden earrings, in the center of which tiny pearls are set.

The first step in changing a flower into gold is to mount it on a tiny pin. Next the flower and pin are placed in a small metal

[*Continued on page* 114]

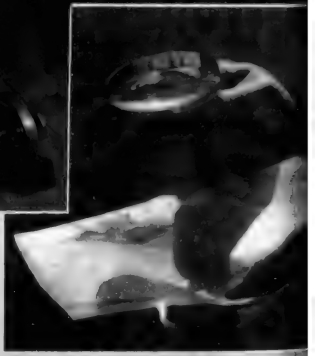
Above: Flower is mounted on pin, then covered with tube.

Above: Tube is subjected to temperature of 2,000 degrees. Right: Gold flower on earring clamp with pearl in center.

FREE POWER From

Dr. Abbot not only collects sun power; he stores it for a rainy day! In this story he sheds some light on using sunlight to bake biscuits and boil beats. He proves that, like the air, sun is also free, and shows how to make use of God's great gift to man.

Dr. Abbot is shown [illegible] solar flash boiler, which raises [illegible] steam in five minutes. It can be used [illegible] heat the house, cook meals and [illegible] a generator. Setting fire to paper with [illegible] and of a magnifying glass is an early [illegible] tion of the use of energy from the [illegible]



DID you ever focus a beam of sunlight, with the aid of a magnifying glass, on a piece of paper or twig to start a fire? If you did, you were practicing one of the earliest methods known to man for using power from the sun. Practically every boy has tried this stunt at some time or other, and scientists haven't been above playing with the idea themselves, on a larger scale.

The dream of science is to harness this free sun power to provide heat and light and drive an engine. Recently, I developed a device which will do this trick. It is a solar flash-boiler, with one-fifth horsepower capacity. Within five minutes, the sun's heat is sufficient to raise steam in that boiler to pressures exceeding 100 pounds per square inch!

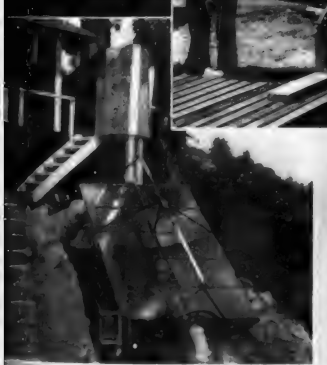
the SUN!

by Dr. Charles G. Abbot

Director, Smithsonian Institution

As told to James Nevin Miller

Right: This queer looking contraption is Dr. Abbot's experimental sun collector attached by insulated pipes to a steam bottle in which pressures are raised to 75 lbs. per sq. in. This is sufficient for 1 hp. The three reflectors convert about 10 per cent of the sun's energy into mechanical power. The best part about this unit is that once it boils, the energy is fed below to a solar cooker installation on Mt. Wilson, Calif. It was used to bake bread and look after in early experiments. Below: sun cooker models on small and streamlined

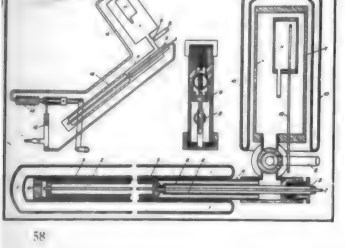


The boiler will drive a small steam engine and in one test its solar power was enough to transmit a short conversation by radio. It may eventually be adapted to bring the sun into the home to cook meals, wash dishes, operate the radio, power the car—even the lawnmower!

The solar flash-boiler marks a new day in the efforts of engineers and scientists to harness power from the sun. I am convinced, after experimenting with this fascinating subject for 30 years, that the sun's rays can be utilized to advantage as an adequate substitute for heat and power. It is quite possible that the city of the future, say about the year 2,000, will utilize solar energy to run trains, supply lighting and provide steam for running its turbines.

In Florida, California and other Southern states, sun machines are already in use providing hot water and purifying drinking water. There are more than 10,000 solar heaters in Florida alone, and some of them

Not a glass-lined water trough! Just another of Dr. Abbot's sun heaters. This one (above) will distill three gallons of water a day (when the sun shines).



Here's a Rube Goldberg explanation of Dr. Abbot's solar flash boiler. (1) is vacuum jacket. Water enters boiler tube (4) through tube (2). Upper end of water tube is enclosed in tube (5) hermetically sealed to enclose a high vacuum to avoid cooling superheated steam. Lower ⅝ of water tube is enclosed in tube (13) known as water spreader. It sprays thin layer of water which bursts into steam in boiler. Conductor spider (6) brings heat from boiler shell through steam to superheat it. From boiler shell steam passes over the mirror to steam chest (7) and to engine feeder pipe (8). A poppet valve (9) stands at beginning of engine feeder pipe. It prevents distillation from boiler to engine feeder pipe when sun goes into cloud, and requires water to back down into boiler ready to raise steam pressure when sun reappears. Insulation (10) prevents heat loss from vacuum jacket (1). Air in chamber (11) is compressed by steam. Tube (12) carries the pressure of steam by air to a liquid filling a syphon (14). Longitudinal expansion of this chamber under pressure increases stroke of water injector pump driven by same motor rotating mirror. Piston stroke varies from zero to a quantity depending on steam pressure, and on adjustment of spring (29). Spring is set to desired steam pressure which is maintained automatically. Water inflow is regulated to exact amount required from minute to minute. When clouds cut off sun, the water input stops.

supply hot water for 1,000-gallon tanks!

By installation of units large enough to produce 2-horsepower each, these machines could be made to convert as much as 15 per cent of the sun's energy. Such machines may be combined in North-South rows at intervals of about 20 feet separation and the rows may be repeated at intervals of 40 feet without shading each other. Thus, within the relatively small space of a square mile there could be located almost 35,000 units to yield a total of about 70,000 horsepower on cloudless days of 10 hours sunshine.

If only one-tenth of the area available is actually covered by heat collectors, (further allowing for night and cloudy weather) the state of New Mexico alone could supply from solar radiation over ten trillion horsepower-hours per year of mechanical power. This exceeds the combined power possibilities of all coal, oil and water at present used annually for heat, light and power in the whole United States!

It may even be possible to store this tremendous surplus sun-energy in underground silos as trapped heat, to be drawn out and used as needed! The "solar-silo" scheme is exceedingly simple. There would be a deep, cylindrical, concrete-lined pit, filled nearly to the top with loose, dry sand and stoppered with about 10 feet of glass wool, an excellent heat-insulator. To the top of the sand would run a branched inlet pipe, from a solar heater of the focusing-mirror type, which I developed. An automatically-controlled pump would bring in the heated air when the sun was shining, and stop at night or in cloudy weather. A second set of pipes, at the bottom, would draw off the heated air as needed. The sand, under its thick blanket of glass wool, would probably retain its high initial temperature for months. Should this scheme

succeed, it might show the way to use the heat of summer to warm one's house in winter, and vice versa!

The focusing-mirror type of solar heater was tried out on Mt. Wilson some time ago. The idea was to store heat from the sun in such a way as to permit all the usual cooking operations such as stewing, preserving, boiling and baking of meats and even bread. This sun machine has a heavy mirror 8 feet wide by 12 feet long geared to turn with the sun.

The scheme was exactly that of a household water heater, merely substituting concentrated sun-rays for a fire as a source of heat. Temperature of 175° centigrade were readily obtained.

There was nothing mysterious about the machine or about the intensity of the sun's rays. Just as a simple demonstration of the potency of the sun's heat and how it could be used even without a special sun machine, I bought 200 feet of black garden hose. I coiled 150 feet of it in a flat coil upon a wooden X, and carried it up the ladder to the south side of a cottage roof. The other 50 feet I connected to the water hydrant in the yard and to a spigot in the bathtub. By this simple arrangement, I could draw 5 gallons of very hot water each half hour on every sunny day!

The arrangement of a solar-cooker is equally simple. The reflecting mirror is concave to reflect the heat of the sun on a metal or glass tube running vertically within the focus of the mirror. A black liquid known as "Arochlor," a product of the Monsanto Chemical Company of St. Louis, Missouri, in which is mixed a small amount of lampblack, is used

[*Continued on page* 117]

Above: Toy solar cooker has mirror surface 15x20 in.; will heat the square oven to 130° C. in an hour. This cooker bakes cakes 3 in. sq. in a half hour.

Above: More than 15,000 solar water heaters are in use in the South. Installed on the side of a building, they partly shade the doorway. Installed on the roof (see below) they conduct heat from the sun to warm water to supply the house man built. The glass panels are criss-crossed by pipes through which water circulates, absorbing heat from the sun.

Cycle Built For Blind Man

A "TWIN" bicycle was recently constructed for a blind man in Geneva, Switzerland. Two ordinary cycles were joined by the crossbars, with the blind man's handlebars a fixture. All steering is done by his wife by means of a connecting rod. A basket on the back enables the couple to take the baby along when they go cycling.

Ends 5,000-Mile Canoe Trip

JOHN CAUSEN, 30-year-old Canadian, arrives in Miami after a 5,000-mile journey from Bismarck, N. D., in his canvas covered canoe. The trip took seven months.

Mechanical Sweepers To Clean Streets

THE "white wings," picturesque figures of the city streets, may go the way of the horse car and the hansom cab. New York City's department of sanitation recently purchased fifty mechanical sweepers to simplify the job of street cleaning. Commissioner Carey and Acting Superintendent Tierney are shown inspecting one of the new tricycle sweepers, which are powered with two-cylinder engines. With the help of this machine, one man will be able to do the same amount of work it formerly took several to do.

Foldboating New Fad

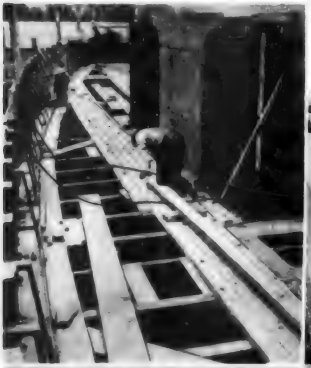
Above: Members of foldboating party from New York City start down the Housatonic on an 18-mile trip from Falls Village to Kent, Conn. Right: A view of the interior of the train which carried the foldboaters and their craft to the starting point and picked them up again at the conclusion of the trip. Below: Two male foldboaters aid a young lady to assemble her boat for the voyage.

FOLDBOATING, a new fad for city dwellers, gives indications of becoming as popular a summer sport as skiing is in winter. A typical party of foldboaters recently made an 18-mile trip down the Housatonic River, which winds through the beautiful scenery of the Berkshire Hills. A special foldboat train carried the party and its boats to Falls Village, Conn., where the craft were assembled and launched. After the voyage the train picked up the group at Kent, 18 miles down river.

Ship to Cruise for Science

Left: The Carnegie, owned by the Carnegie Institution of Washington, was the first magnetic ship and predecessor of the Research. She was lost in 1929 off Samoa, after an explosion and fire.

THE R. R. S. Research, half a million dollars worth of sailing vessel built in England to study variations in the magnetic field surrounding the earth, will dispense with all but 700 pounds of magnetic steel and iron, a tiny fraction of the 600,000 pounds of metal aboard, in order to insure an accurate survey. The hull is of teak, with oakum caulking between the planks. The framework and propeller are of bronze, and the windlass, winches and standing rigging of aluminum bronze. Fuel for the Diesel engine, which has a non-magnetic steel crankshaft, will be carried in bronze tanks. Crew members will not even be permitted to carry steel pocket knives.



Above: Planking is laid across a framework of copper and bronze. Right: Caulking with oakum.

Flying Wing Has Largest Pay Load

THE Flying Wing, new eight and a half ton, British built, commercial monoplane, has the largest pay load of any flying machine in the world, due to the absence of a fuselage. Its designers expect it to revolutionize civil aviation. The plane, shown during a trial flight over Southampton, England, is capable of flying nonstop from London to Lisbon with a full load of mail and 15 passengers.

Stamp Truck Goes On Tour Of Nation

THE Post Office Department recently sent a new philatelic truck, offering a complete exhibit of United States postage stamps, on a tour of cities throughout the country. In the photo above, Ralph Davis, philatelic lecturer for the Department, is shown, explaining part of the exhibit to two collectors

How Diving Bell Saved

MAN won a great victory against the sea, when new inventions, used for the first time in actual rescue work, brought 33 men to safety from the submarine *Squalus*, sunk in 40 fathoms off the New Hampshire coast.

In one of the most dramatic rescues in marine history, the submarine rescue chamber—or diving bell—on which naval experts have been working for twelve years, proved itself in the most rigid test in the history of the navy. Down 240 feet, a depth from which no rescue had ever before been effected, the bell descended four times to bring up the 33 living members of the ill-fated *Squalus'* crew.

The bell—a gateway from doom for the 33 men it saved—is a pear-shaped chamber of steel ten feet high, tapering from a diameter

One of the first of the forty divers aboard the *Falcon* to go down, preceding and preparing for the lowering of "the bell," which is here shown on the *Falcon's* deck.

Members of the salvage vessel *Falcon's* crew lowering the diving bell over the side of the rescue ship, preparatory to its 240-ft. descent to the disabled *Squalus*.

33 Of Squalus' Crew

of 8 feet at the top of 5 feet at the bottom, and weighing about 18,000 pounds.

The bell is divided into three parts—the upper and lower compartments, connected by hatches, and the ballast tank, which runs all the way around the lower compartment. The ballast tank and the lower compartment each have a capacity of about 4,000 pounds of salt water. The open bottom of the lower compartment is circled by a huge rubber gasket.

The upper compartment, in which the crew of two and the passengers ride, contains the air motor, electric lighting equipment, telephone, and all other equipments except the winch, on which is reeled the 450-

[*Continued on page 118*]

Right: Artist's diagram of the dramatic rescue of the men aboard the ill-fated *Squalus*, showing the inside of the diving bell while clamped to the escape hatch of the submarine. Letters denote the more important features of the bell's mechanism. A—Cable and air line to rescue ship. B—Entrance hatch to upper compartment. C—Compressed air motor to operate winch (F). D—Water manifold. E—Removing hatch between upper and lower compartments of the bell. F—Winch on which down-haul cable is reeled. G—Ballast tank. H—Lower compartment. I—Escape hatch of [illegible] rubber gasket on [illegible] to escape chamber of [illegible]

Busman's Holiday

Left: "Amos," but not in black face, at the controls of his amateur short-wave station W6QUT. The transmitter is behind a glass panel, in the rear.

Below: "Andy" plays with radio, too, but only as part of his flying activities. He is a licensed pilot and flies this Stinson "Reliant" himself.

Left: "Andy" checks with the airport by radio before landing. This photo was taken in the air especially for MECHANIX ILLUSTRATED. Below: "Amos" in his completely equipped darkroom.

THE letter carrier who hikes in the woods on his day off, the sailor who hires a boat in a city park when he has shore leave, the taxi driver who takes his family riding on Sunday . . . all are pikers compared to "Amos"—Freeman Gosden—of the famous radio team of "Amos and Andy." After an unbroken decade of broadcasting he still likes microphones, so much so, in fact, that when he isn't appearing in character before the CBS mikes, he uses his natural voice on his own powerful amateur short-wave station W6QUT, in Los Angeles. And just to keep in touch with things when he's between the studios and his home, he agitates the ether with a mobile station in his car! Many an

[*Continued on page* 113]

Air, Water Thermometer Convenient For Bathers

CONVENIENT for the bather is a novel thermometer at Twickenham Open Air Baths, London. Temperatures of air and water are recorded on two large cylinders, plainly visible from any portion of the pool

Light Switch In Door Knob

A LIGHT switch conveniently located in the knob of a door eliminates fumbling around in the dark for a button on the wall. The mechanism is invisible in the hollow knob. Conduits, insulated to prevent accidental shock, pass through the interior of door and hinges.

Ancient Hulk Found On Carolina Coast

THE aid of science has been sought to solve the mystery of this ancient hulk, recently discovered on the North Carolina coast. Bolted with wooden pegs and bronze spikes, her hull checks with specifications of the cromster, a 16th Century war vessel developed by Sir Walter Raleigh, leading to the belief she may have belonged to the lost colonists of Roanoke Island. Her keel is 58 feet long, her foremast set back 25½ feet and her aftermast only six feet from the stern end of her keelson. Her timbers are oak and locust, apparently hand-tooled. Coast guard files have no record of her.

Small House Trailer Towed By Motorcycle

THIS motorcycle trailer, which is 43 inches wide, 44 inches high and seven feet long, is heated by a kerosene stove and contains a full-sized cot, five-tube radio, electric lights and ventilators in the roof. It has seven screened windows. Its owner, Otto Gerling of Ellensdale, N. D., recently used it on a 6,000-mile pleasure jaunt.

Attachment Cleans Ashes From Pipe

A PLUNGER attachment solves the annoying task of cleaning ashes out of the bowl of a pipe. A hole is drilled in the bottom of the bowl, and a space along the stem is countersunk. Inside the bowl is a cloth covered plunger, attached to a small metal bar which passes through the hole. A joint permits the bar to be raised upright, so that the plunger can be pushed upward through the bowl, moving the ashes before it. When the bar is not in use, it lies in the countersunk groove, out of the smoker's way. A flange holds it securely in place.

Designs Tail Wheel Brake For Airplanes

AN AUXILIARY tail wheel brake is the invention of Archie Baxter, Floyd Bennett Airport pilot. Made of bicycle parts, this brake can be adapted to any size plane and can be applied hard when landing without fear of nosing over. It will bring a plane to a stop with a 30-mile an hour wind behind it, the designer claims, and is ideal for parking purposes, taking the place of chocks. Operated from the cockpit by a hand lever, the entire assembly weighs only four pounds.

Photographed Map of U. S.

Aerial photographer, above, points camera at distant object.

UNCLE SAM is "looking at the birdie." Uncle Sam is sitting for a portrait—the biggest, the most expensive, the most valuable portrait ever made.

More than 3,000,000 square miles of America are being crowded into the photograph; it's costing more than $12,000,000, but it will probably return hundreds of millions of dollars in dividends to Uncle Sam's citizens before it becomes obsolete; in fact, it already is turning in dividends even before the photograph is fully complete.

Sure, it's an aerial photograph—in fact, it's hundreds of thousands of small aerial photographs, all cut out, measured, and fitted together, like a jigsaw puzzle, to make a complete aerial photograph of the entire United States, of every acre of it, every field

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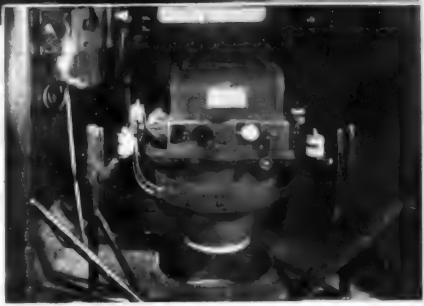
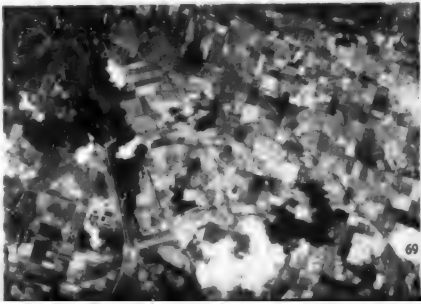


Above: The aerial camera is shown in position in the plane, ready for map making. Below: The finished air map shows the location of fields, roads, streams, woodlands, township lines, etc., in clear detail.



Treatment For Rheumatism

MINERS at Manvers Main Colliery in England can now undergo treatment for rheumatism. A therapeutic bath, believed to be the first of its type introduced in an industrial undertaking, has been installed for the use of those afflicted. Compressed air enters the water from a tank beside the bath, and its flow can be controlled by the occupant by means of a tap.

Gloves Resist Blow Torch

THE effectiveness of fire resisting gloves, developed for industrial workers subjected to fire and heat in their work, was strikingly demonstrated by a research scientist when he cooked an egg by means of a blow torch flame. The experimenter held the egg in his fingers while cooking, and although the intense heat from the flame completed the job in a second or two, his hand remained comfortably cool.

Model Ships Gauge Velocity Of Wind

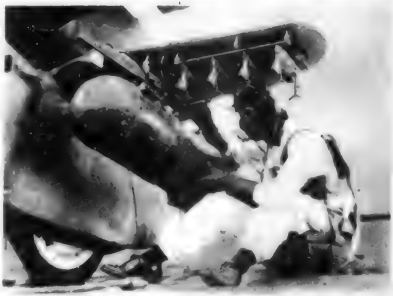
A UNIQUE device to determine the velocity of the wind has been erected at Dennings, a seaside town in England. It consists of four small model sailing ships which revolve when the wind strikes their canvas. From the speed with which the tiny ships travel on their circular course, visitors to the resort are able to gauge how fast the breezes are blowing.

Plane Designed To Carry Cannon

DONALD DeLACHNER, engineer, exhibits the model of a twin-motored pursuit ship, designed by him, which can fly 400 miles an hour and fire 100 shells a minute from a 37 millimeter cannon mounted in its nose. An actual size shell is shown beside the model. The cannon, which operates like an automatic pistol, has been completed and tested at an armament firm's proving grounds.

Food, Ammunition Dropped by Planes

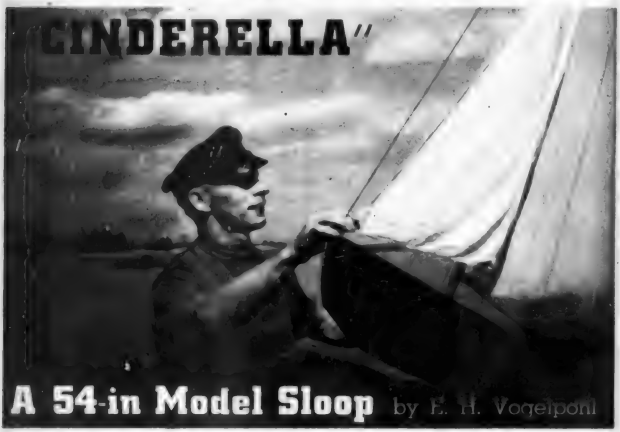
IF WAR should strike England, her new army will receive supplies of food and ammunition in containers out of the sky. The containers are large cylinders, to which parachutes are attached so that they may be dropped from speeding airplanes. The picture at the right shows a container being put in place on a special rack on a Lysander plane during a demonstration of the method at Hawkinge Station of the Royal Air Force.



Machine Plucks Poultry Feathers

PLUCKING feathers from poultry by hand has always been a tedious task for chicken dealers, caterers and farmers. A machine has been invented, however, which really makes the feathers fly, as can be seen from the picture at the right. Not only does this device, a product of England, make plucking a pleasure, as indicated by the expressions on the faces of the pluckers; it also completes the job in less than half the former time.

How to Build SECTION



A 54-in Model Sloop by E. H. Vogelpohl

CINDERELLA is a working scale model of an 18-foot sloop. The convenient scale of three-inches-equals-one-foot produces a replica 54 inches long; big enough to lift it out of the toy class yet small enough to transport and handle conveniently.

In nine months' extensive sailing and hard usage on the open and sometimes tempestuous waters of Long Island Sound *Cinderella* proved herself truly a little princess, ending the critical season with a creditable record of performance. A fleet of two or more of these realistic, inexpensive models in your community will provide endless hours of exciting fun through thrilling races and regattas. Too, the little replicas will teach the embryo yachtsman many fine points about handling real sailing craft.

Complete plans and instructions for building a beautiful sailing scale model of an 18-ft. knockabout that packs all the thrill of a big cup defender.

Construction details have been so simplified that no special skill in craftsmanship is required to create a beautiful, staunch and sea-worthy model.

The hull—Sides, bottom and deck are made of $\frac{1}{4}$-inch mahogany plywood. The transom is of ½-inch oak. The stem-post is fashioned from a piece of oak 2x1x7 inches. The chine and sheer clamps, to which bottom and deck are screwed, are of ½x¼-inch whitewood trim. Except where otherwise mentioned, all hull and center-board trunk fastenings are made with ⅜-inch, No. 0, flathead, bright iron or brass screws driven in from the *outside*, heads flush with surfaces.

Two coats of orange shellac (or one of casein glue) are applied to all touching surfaces of joints and permanent attachments are

made while second coat is still wet.

Start work by laying out the full size pattern for one side of hull directly on the plywood as per design. This is done by drawing the crossed horizontal and vertical lines, marking the points where outline of pattern crosses them by sticking pins into the board, at such points, bending a batten around pins and marking the path of the batten on the board with a pencil. Cut out the pattern, not directly on the line but rather ⅛-inch outside of it, the surplus to be cut away later.

Place the cut out on your stock panel of plywood and mark around it. Then cut out the second piece directly on line. Now bring both pieces together so that all edges are even, penciled layout toward outside, showing. Push pins straight through both pieces along the water line and other strategic points designated in drawing. Pins serve the dual purpose of holding pieces securely together while trimming them simultaneously to the exact contour of one layout and also transferring vital positions to the second piece. Place attached pieces in vise and plane away surplus wood to within $\frac{1}{16}$-inch of the line. Very carefully finish to the line with a No. 1 sandpaper block and you will have two identical sides for your hull. Hereafter these side pieces will be referred to as "planking."

Before separating planking, mark off on the top edge of both the points at which the cockpit begins and ends. Also, mark the vertical, midship check-line on the second plank.

The waterline is scribed on both planks by means of a batten bent around pins. Use a hard pencil and let it bite into the wood so the line will not be lost completely in painting of hull.

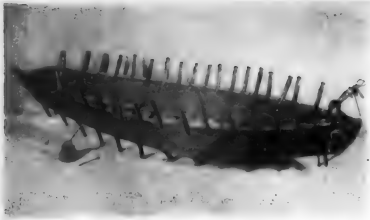
Next make the deck formers, stem-post and transom as per drawings and be sure to include a fine, sharp center line on stem and transom to help in squaring up the hull later.

Temporarily assemble planking, stem, deck-formers and transom. Do not take up on the screws tightly. Be sure that the curved, bow edges of planking and stem just meet throughout the entire length of the curve.

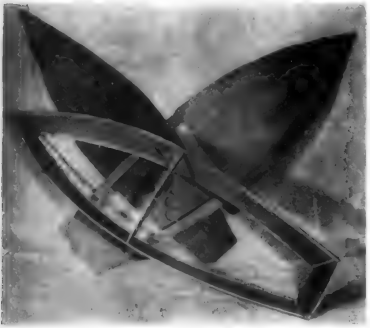
The resulting V-shaped space between front edges of planking is filled in with plastic wood or a length of ¼-inch, birch dowel steamed and bent to shape. The latter is very tough and makes a better, more durable job. It is shellacked into place with three screws through it and into the stem for reenforcement. The dowel may be left round

He could almost climb aboard. This youngster obligingly stands beside *Cinderella* to give definite size comparison.

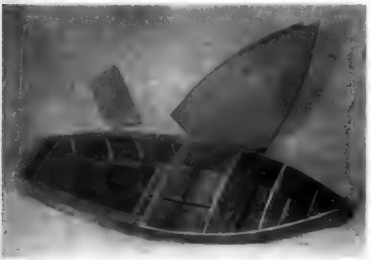
Close-hauled on the starboard tack. Only the absence of a crew marks this as a model, so realistic is its appearance.



Chine and sheer clamps can be conveniently held in place while glue is drying by means of ordinary clothespins.



Sides assembled to stem and transom with main deck beam in place. Rough-cut bottom and deck are seen in background.



Bottom attached and deck ready to go on. Note mast step under No. 2 thwart and slot for centerboard trunk.

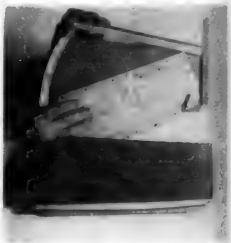
but sanding it to a blunt point makes a more ship-shape finish. Undertake this detail after planking has been permanently attached to stem.

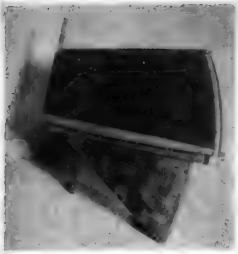
Since the sides of the hull are curved, only one edge of the deck formers will touch the planking. The gaps between beams and planking are filled in with plastic wood after the assembly has been squared up with and permanently attached to the bottom. This method of attaching beams is efficient and much easier than bevelling the ends of formers to suit the curve of the sides.

When satisfied that all work is correct, waterproof joints at stem and stern with glue or shellac and fasten parts permanently.

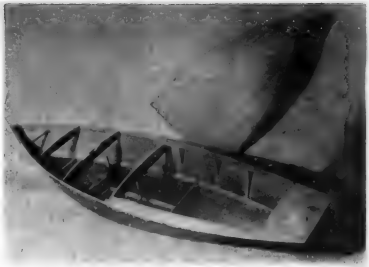
Chine and sheer clamps are attached to the inside of planking with casein glue. These clamps are of ½x¼-inch whitewood trim, about five feet long. The exact length of each clamp is best determined by individual, cut-and-try fitting. The sheer clamp should be flush with the top edge of planking but the chine clamp must project about ⅛-inch below the bottom edge of planking to allow for bevelling later. While the adhesive is drying the clamps must be held firmly against the planking at all points. Clothes pins, spaced two or three inches apart, serve ideally for this

Centerboard trunk pieces cut out and partly assembled. Bed log (strip at bottom) is curved to follow shape of the bottom.





The pieces projecting below bed logs are cut off after trunk has been installed. Centerboard shown is a dummy (see text).



Hull complete except for forward decking. Four knees on each side support the narrow deck alongside the cockpit. Centerboard trunk is in place.

purpose. Allow plenty of time for the adhesive to dry and harden before removing clothes pins.

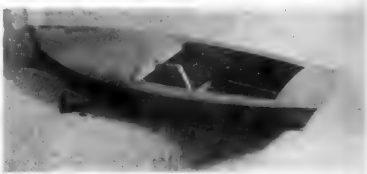
The next detail is to bevel the bottom surfaces of the chine clamps by placing the assembly up-side-down and sanding with No. 1 sandpaper wrapped around both ends of a stick laid across clamps. Sand both port and starboard clamps at once with short, fore-and-aft strokes. Cut away all surplus wood, including some of the planking, until sandpaper just reaches the seam between clamp and planking. Then *stop*. Bevel bottoms of transom and stem.

Bevel sheer clamps one at a time with plane or sandpaper block. The varying angle of cutting is indicated by the camber (curve) of the deck formers. Do not cut into planking at sheer.

The tops of the deck formers and transom are bevelled by laying an eight-inch stick, with sandpaper wrapped around each end, across two of these thwart members. Sandpaper stick will touch only one edge of each beam: cut until the opposite edge is just reached. Then *stop*.

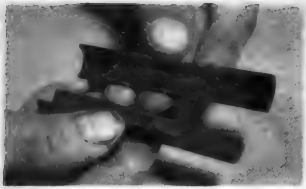
The bottom piece is laid out full size directly on the plywood in the manner used in plotting the curve of planking. Be certain that the horizontal center-line and the vertical, midship, thwart line are perfectly straight and at right angles as they serve to square the hull with the check-lines on planking, stem and transom. Cut out bottom piece about ¼-inch *outside* of outline. Cut slot for center-board trunk directly on line

[*Continued on page* 86]



Ready for the rigging. Before this is done, however, the projecting portions of deck and bottom must be trimmed.

And a beauty she is with her tall, graceful Marconi rig. Tiller has a simple automatic steering hookup that keeps her on a straight course at all times.



Preventing Pipe Wrench From Marring Pipe

IN ORDER to keep the surface of a pipe (such as brass or chromium) from being scratched or otherwise marred by the teeth of the wrench, a second piece of pipe makes an excellent buffer when used as shown above. Split the second pipe, which must be a size larger, down the center with a hacksaw as at left. Smooth the inside surface with a round, or rattail file and emery cloth. Place the two halves around the pipe being installed and the wrench may be applied without damage.—*Benjamin Nielsen.*

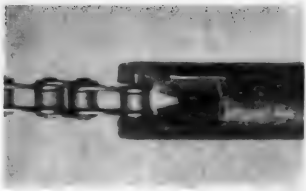
WORKSHOP

V Blocks From Quarter-Round Moulding

ONE or more V blocks are very useful jigs to have about the shop for holding round stock steady while drilling, and for a variety of other operations. If you have no regular V blocks on hand a pair can be quickly improvised by using a strip of ordinary quarter-round moulding sawed into the lengths desired and screwed or glued to wooden bases. Apply two lengths of the moulding to each base piece so as to form a V-shaped slot through the middle as shown. These blocks will be found strong and rugged enough to withstand hard usage and can be used for all purposes to which regular steel blocks can be put.—*W. C. Wilhite.*

Sandpaper Improves Circular Saw Push Sticks

THE ordinary push stick which is used to feed wood to the circular saw and other tools may be made much safer and easier to use if it is equipped with a strip of sandpaper as shown. This should be of a course variety and preferably fastened to the stick with glue. —*Howard R. Heydorf.*



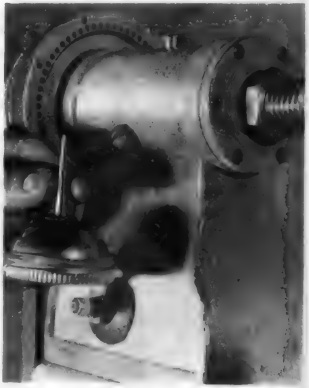
Adjustable Wrench From Old Bicycle Chain

A WRENCH that will tighten almost any size screw-cap lid and loosen the most stubborn may be made from an old bicycle chain and a 12-inch length of ½-inch pipe. A slot is sawed in one end of the pipe and the edges spread apart so one end of the chain may be inserted and riveted in place. Proper leverage is obtained by sawing a second slot in the pipe, directly opposite where the chain is riveted, through which the chain may be slipped. The chain runs through the pipe and into another slot in the side of the pipe.—*N.*

SHORTCUTS

Jar Lid And Suction Cup Hold Oil Can

IT IS usually desirable to have an oil can at hand when using machine tools but these cans have a tendency to move with the vibration and usually fall to the floor. A handy non-skid holder for the oil can may be made from a jar lid of a size to fit the can snugly and a suction cup. The lid is fastened to the suction cup with a small brass angle piece as shown. This holder may be fastened to the machine in any desired position and may be changed at will.—*H. R. H.*



Cutter Trues Grinding Wheel

AN EXCELLENT dressing tool for keeping your grinding wheels true and fast cutting can be had at practically no cost by mounting a discarded cutter from a rotary pencil sharpener at one end of a wooden handle so that it may turn freely. Use a 10-inch length of 1x2-in. stock for the handle and plane it down somewhat so that its width is ½-in. greater than the length of the cutter. Round the edges and sand them to make a comfortable hand grip. Secure two steel straps to one end of this handle with stove bolts. A long machine screw forms the shaft for cutter, the nut being locked securely.—*W.*

MAKE YOUR

by Dale R. Van Horn

Three pages of useful suggestions for improving the appearance of your house and grounds.

Pot Trellis Windows

TO FURTHER enhance the beauty of a small home you can install attractive lattice-like frames around the windows flanking the front door. Three flower pots rest in holes through the sill board, lending the windows a charming old-world touch. Projection is seven inches, the top trimmed with molding and scalloped boards across the front and ends. The latticed sides are 1½ inch square vertical pieces with ¾-inch square pieces running criss-cross. Sill is trimmed with narrow scalloped pieces.

Swing In Sash Unit

CONSIDERED much superior to regular storm sash, these swing-in sash units are easily installed and fit the window openings in the usual way. However, the lower segment is left open and later fitted with a separate hinged unit which may be opened from inside and set at any angle. This type of sash may be fastened firmly with screws to the casement and these removed only in the spring when the sashes are taken down for the summer.

Comical Pup Foot Scraper

CONSISTING mostly of angles, this happy-go-lucky puppy stands firmly in a concrete block beside the walk waiting for you to scrape your shoes on his not-too-sharp back. The pup, about 16 inches long over all, is cut from $\frac{1}{16}$-inch sheet iron with hack saw, cold chisel and file, smoothed up, set in the block and painted. Eyes nose and mouth are drilled out.

HOME MORE ATTRACTIVE

Vertical Sun Dials

A VERTICAL sun dial on the side of your house will be a constant source of favorable comment from friends. Moreover, it will, if properly made, prove quite accurate—and it's fun to make. The numerals must be opposite and reversed from a clock face. The numeral 12 is at the bottom where the 6 is on a clock face; 1, 2, etc., to the right of 12 and 11, 10, etc., to the left.

Above is shown an exceedingly simple vertical sun dial. It comprises, first, a half circle of ½-in. iron rod which is laid about an imaginary circle on the side of the house 65-in. in diameter. The hand wrought numerals, of ¼-in. rod, are soldered, riveted or welded to this curve. Shadow arm is iron strap 1-in. wide, ⅜-in. thick and 26-in. long. It is made rigid by a ⅜-in. rod shaped into a scroll which in turn is welded or soldered to the vertical iron ¾-in. square.

To make sure just where each numeral is to go hang up the dial in place temporarily before sun-up. Using a ladder, mark just where the shadow strikes the curved rod at each hour during the day. Take the fixture down, attach the numerals and replace again, permanently.

At right a different type is shown. This is made from a rectangular piece of weather-proofed presdwood 24x36-in. It is fitted in a wood frame with mortised corners. Radiating lines run from the top, back edge of the shadow triangle out to the numbers and these number locations also were found by the method just described. The triangle is cut from rather heavy gauge sheet brass, painted black. Rectangle is painted white and lines and numerals dark.

Any south wall of home, garage or other

building, makes an appropriate location for your sun dial.

Even when the building does not set exactly "square with the world" one of these sun dials will be effective and accurate, if the numeral locations are found in the manner above described.

Bird House On Garage

A SPOT just over the garage door is quite appropriate for a colony bird house. Sturdier than when mounted on a pole on the roof or in the yard, here it needs no special support. The house is made from ½-inch thick boards and the compartments are 6 by 6 by 6 inches inside measurement. With holes 2½-inches in diameter and the two ledges, this colony house is an ideal set-up for Martins, our most popular bird.

Lattice Trash Catcher

THIS lattice trash catcher is a boon in the large back yard. Made of scraps of lumber sawed to width and length in the basement shop, it can be assembled and fastened against a tree to take odds and ends of refuse about the place. Once a week it can be emptied into the garbage can or refuse burner. As it is painted white the contents do not readily show through the pickets.

Mail Box Name Plate

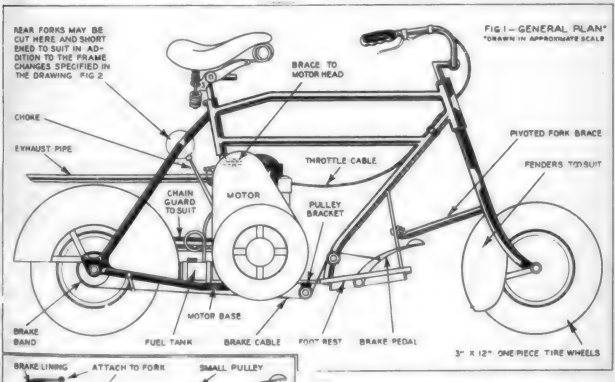
CUT rather heavy gauge sheet aluminum into strips of uniform width and of a length depending upon the number of letters in the name to be inscribed. The first step is to thoroughly clean and dry the metal. Then it is double dipped in black paint. A small router bit is now set in the drill press and the letters cut with this through the paint and about $\frac{1}{32}$-inch into the aluminum itself, making the plate identification permanent and completely weather-proof.

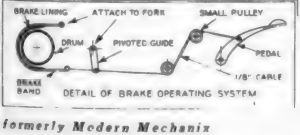
POWERED BIKE

Build this simple, practical little motorbike and learn what economical transportation means.

USING an ordinary bicycle frame which can be picked up second-hand almost anywhere for very little, this sturdy powered bike is easy to build and assemble, and will give exceptionally satisfactory results. The bicycle frame should be cut as shown below in Fig. 1. As it will have small, thick wheels of the size indicated, the forks of the frame must be spread to accommodate them, Fig. 2, page 92. Assembly details at the front forks are given in Fig. 3.

The motor base consists of strap iron about 12 to 14 inches long by 4 to 5 inches wide. The size of this piece varies according to the motor used. Details are in Fig. 4. Two old motorcycle foot rests serve the same purpose on the

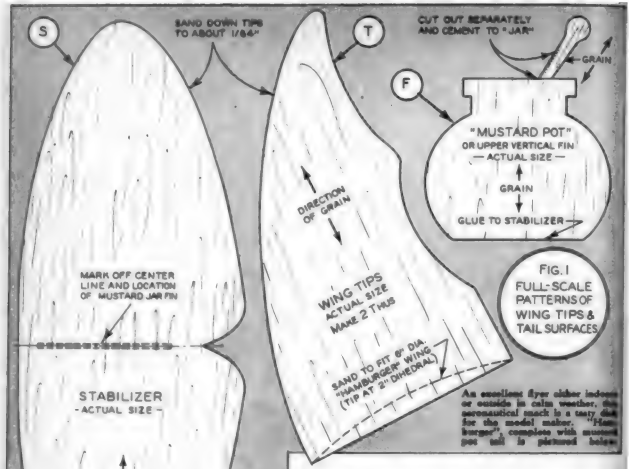




bike. They are supported by a brace of ¼x1-inch strap iron to one side of which the brake pedal is attached.

Fig 5 shows progressive assembly up to

[*Continued on page 92*]



An excellent flyer either indoors or outside in calm weather, this aeronautical snack is a tasty dish for the model maker. "Hamburger", complete with mustard pot tail is pictured below.

The "FLYING

by Alan Orthof

A CURIOUS mixture of the gastronomic art and the science of aerodynamics is here presented in what may be termed a "Flying Hamburger."

In spite of this ship's freak appearance, excellent flights are obtainable. Consistency in flying and the ability to take hard knocks makes this little ship ideal for summer flying.

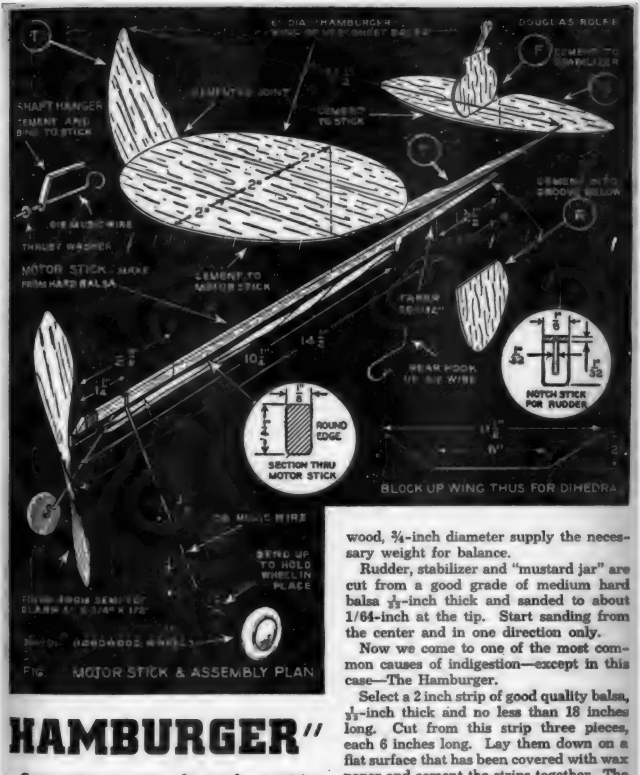


FIG. MOTOR STICK & ASSEMBLY PLAN

HAMBURGER"

Construction is extremely simple, requiring only one hour at the most to complete the entire model.

Cut motor stick to required length from a strip of ⅛x¼-inch hard balsa. Round off corners slightly with fine sandpaper. Attach thrust bearing to front of motor stick and wrap securely with thread. Rear hook is bent from .016 piano wire and cemented in place were shown. Landing gear is also bent from .016 wire and cemented in place. Wheels of hard wood, ¾-inch diameter supply the necessary weight for balance.

Rudder, stabilizer and "mustard jar" are cut from a good grade of medium hard balsa 1/32-inch thick and sanded to about 1/64-inch at the tip. Start sanding from the center and in one direction only.

Now we come to one of the most common causes of indigestion—except in this case—The Hamburger.

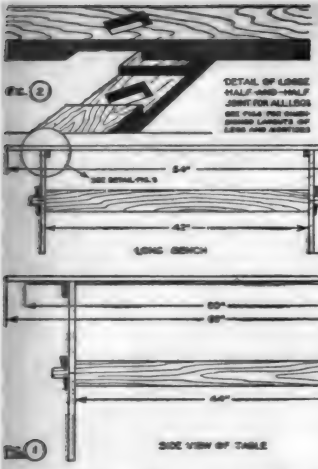
Select a 2 inch strip of good quality balsa, 1/32-inch thick and no less than 18 inches long. Cut from this strip three pieces, each 6 inches long. Lay them down on a flat surface that has been covered with wax paper and cement the strips together. The wax paper prevents the cement from sticking to the surface thereby eliminating any danger of cracking the wood on removal. Now take a compass and draw a 6-inch circle on the balsa. Follow the outline very closely when cutting. Sandpaper the entire surface until all rough spots are removed.

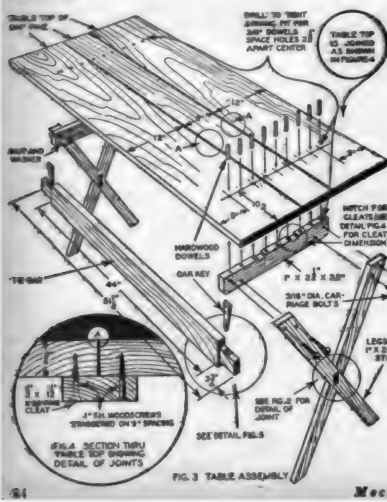
Wings are also cut from 1/32-inch sheet

[*Continued on page 119*]

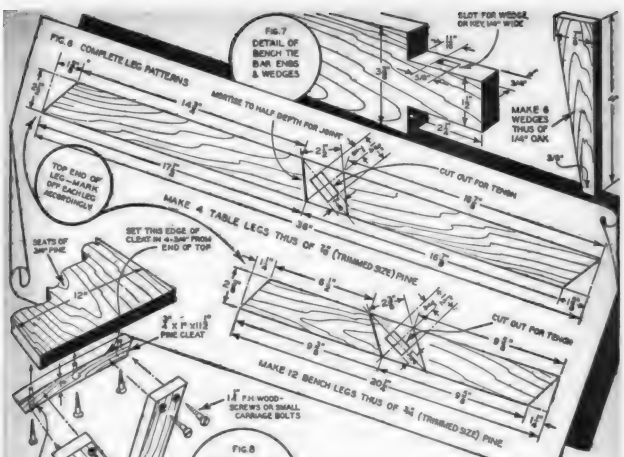
Refectory Table And Bench Set

by Douglas Rolfe





HERE is a practical and versatile table set which combines utmost simplicity in design with low cost and real beauty. The benches may be used at either side of the table or the two shorter benches may be placed at each end of the table, thus enabling you to seat guests on both sides of the table lengthways or along one side and at each end. The divided benches also lend themselves admirably for general use as occasional tables. They can also be



placed together to form a small, low square table of the type now so smart for serving light lunches and tea.

The choice of lumber is up to the builder and the state of his purse. The original set is of plain pine stained and waxed and the total cost of the lumber ran quite low. It is possible to obtain remarkably fine finishes on cheap pine by following the finishing directions given later on in this article. The design lends itself admirably to red maple, but whatever wood or finish you select the results will be pleasing, and the completed set exceptionally strong and durable due to the entire lack of glued joints to dry out and cause the annoyance so often found in even expensive commercial furniture.

All joints are by mortise and tenon, carriage bolts, woodscrews or dowel pins. The entire set can be dismantled quickly for convenient packing and in knock-down form takes up very little space for shipping or storage.

Every major dimension and detail of joint is given in the accompanying drawings and a cross-reference of individual figure numbers is added for the convenience of those whose knowledge of plans and construction methods is limited.

If you are not much of a hand at cutting a mortise, follow the author's procedure and have the local mill handle this part of the job. It will add a little to the total cost but an absolutely perfect fit at all joints will be your reward.

Before commencing actual construction refer to the general plans, Fig. 1. Of course if you are an expert these plans will tell you all you wish to know but, assuming you are not entirely expert they will not only give you the principal dimensions but also serve as a key to the detail sketches provided.

Start the construction by making the legs for both table and benches. The legs are simple cross pieces mortised together to a snug fit as shown in Fig. 2. The joint is secured when the legs are assembled by a tie-bar or brace which connects the legs and is mortised into them and held fast by a wedge-shaped piece of hardwood at each end. The details of this joint are explained in Fig. 5 and Fig. 7. Two complete legs are needed for the table

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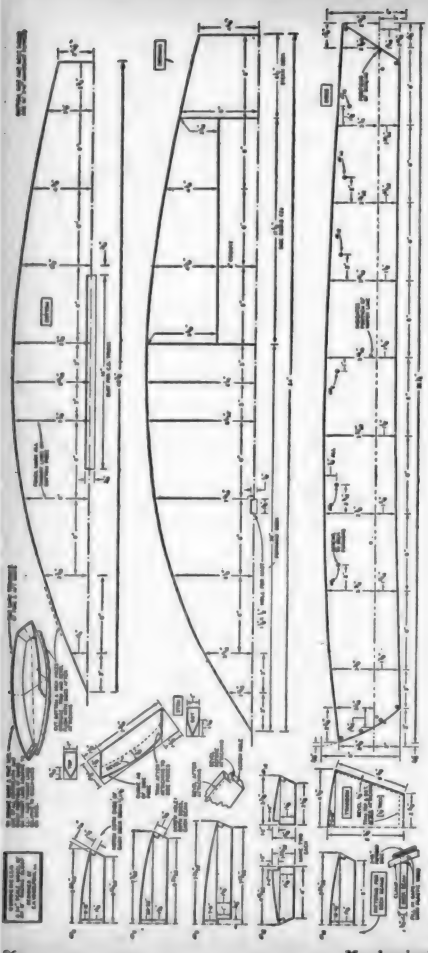


[*Continued from page 71*]

and carefully with a sharp razor blade.

Fit bottom to hull temporarily with ten or twelve screws. Be sure that the center lines of bottom, stem and transom coincide and that the check-lines on planking fall on the thwart check-line on bottom. The chine clamps should be equidistant from the center-line of bottom on each thwart line. Pins, indicating these equidistant points, stuck into bottom will be helpful in reattaching bottom permanently, later.

In this type of construction the plan or outline of the bottom is not predetermined exactly while designing hull. The precise curve is dependent upon the flexibility of the particular piece of planking used in each individual job. Since the flexibility of plywood varies so greatly, it is unlikely that the bottom edge of planking of your hull will fall naturally on the outline penciled on the bottom-piece. Do not be alarmed but rather expect a slight variation. The planking may be eased into position with gentle pressure; undue forcing will affect the sweep of the sheer line so be careful. In some cases it may be advisable to simply scribe a new outline on the oversized bottom-piece which then will be correct for that particular job.

Remove bottom and drill or pierce screw holes two inches apart and $\frac{1}{4}$-inch from the corrected outline. Partially insert screws into all holes from the in-

Measurements and contours of side, bottom and deck are given in plan at left together with stem, transom an

marked outside of the bottom. Treat all touching surfaces of clamps, planking and bottom with a liberal coat of casein glue and immediately re-attach bottom permanently in the same position it occupied in the trial fitting.

The deck is constructed in the same manner as the bottom except that it is composed of four pieces instead of one. The forward deck is attached first; then the stern deck. The side decking is cut a trifle oversize and sprung into place, butt joining fore and aft decks. The butt joint is reenforced by a strip of plywood underneath decking to which decking is screwed along both sides of the seam.

But before attaching the deck permanently all work on the inside of hull such as the installation of center-board trunk, mast step, thwart beams at bottom, etc., including three coats of gray paint, must have been completed. The skeg, too, although an outside appendage, should be attached to bottom before stern deck is on. Shellac touching surfaces of skeg and bottom.

The center board trunk is composed of seven pieces; two sides of $\frac{3}{4}$-inch plywood, two side-pieces of ½x½-inch whitewood, two end-pieces of ⅜x½-inch whitewood and one ⅜-inch length of quarter-inch, birch dowel. The latter forms the peg which supports the center board.

The plywood sides extend through the slot and project beyond the bottom of boat, the projecting surplus being trimmed away flush with bottom after trunk has been permanently attached. Cut out both sides at once. Drill or pierce screw holes ¼-inch from front and back edges about one inch apart. Insert sides in slot in assembled bottom as far as they will go and scribe a line indicating where the inside of bottom touches them; then continue with making screw holes ¼-inch above this curved line. Next give three coats of varnish to the surfaces which will come inside of the trunk.

The side-pieces of ½-inch square whitewood trim extend the full length of the plywood sides. They are slightly curved at the bottom to conform to the curve of the chine. This precision job is easily accomplished by placing each side-piece over the exact position it will occupy on bottom of boat, then, with a pencil laying flat on the bottom and at right angles to the side-pieces, scribe a line. It will conform exactly to the curve of the bottom. Trim to line and attach to the unvarnished, outside surface of plywood side;

BILL OF MATERIAL

1—¼"x48"x60" panel of mahogany plywood for sides, bottom and deck of hull and sides of center-board trunk.
1—¼"x12"x60" white pine board for deck formers, coaming, boom, rudder, sliler, skeg and keel.
1—½"x10"x12" oak board for transom.
1—¾"x2¼"x7" oak stock for stem-piece.
2—½"x½"x80" white pine molding for mast (or one ½"x1"x82").
4—½"x½"x60" strips white wood trim as above for chine, sheer and deck clamps. (Two strips sawed in half will do.)
Use ½"x½" scrap for C. B. trunk side-pieces, C. B. trunk end-pieces, mast-step, thwart members and other hull bracing.
2—½"x60" lengths of half-round, hardwood molding for rub strakes.
1—¼"x60" length of birch doweling for finish at bow and (trimmed to 3/32 round) for inserting in hem at foot of main sail.
1 gross ½", No. 0, flat head, bright iron screws.
1 pkg. pins. 1 doz. No. 4 screws, misc. lengths and beads.
2 doz. small screw eyes. ½-lb. casein glue (powder).
4 sheets No. 1 sandpaper. 2 sheets No. 0 sandpaper.
½ pt. orange shellac. ½ pt. spar varnish.
1 qt. white paint. ½ pt. each gray and green paint.
2 strips 23 gauge, ½"x60" galvanized sheet iron for sail rack and cleats, etc.
1 spool thin fish line for stays.
1 spool thick fish line for halyards etc.
2½ yards light-weight, unbleached muslin for sails.

drive screws from the varnished, *inside* surface.

The end-pieces of ½x⅜-inch whitewood fit between the sides, one piece at each end. The front piece is straight and extends from the bottom of boat to the deck. It is screwed to both bottom and deck from the outside. The other end-piece is steamed and bent to shape and extends from bottom of boat to top of the trunk. They are set in shellac and fastened with screws driven in from the outside, unvarnished surface of the plywood sides.

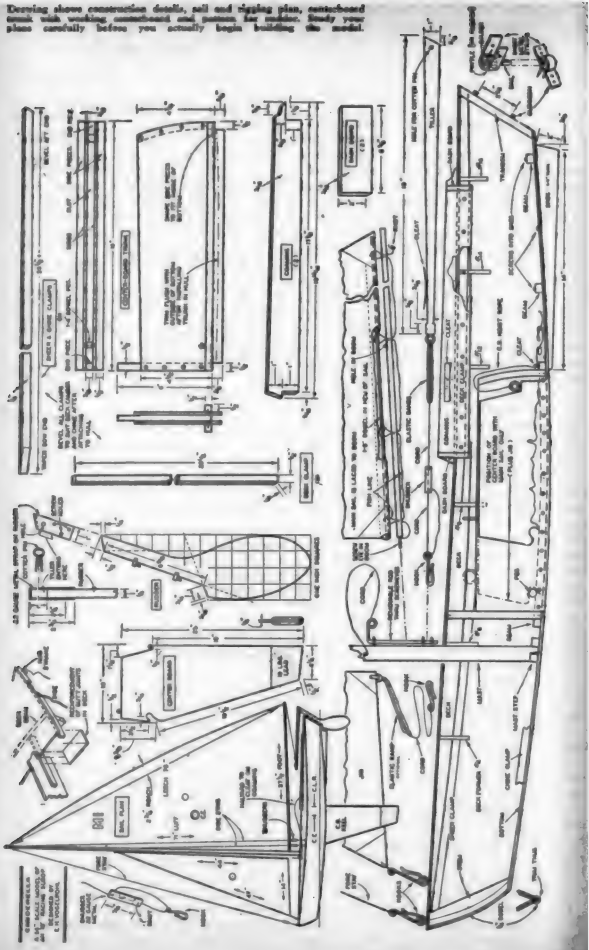
Attach both end-pieces to one plywood side first. Then attach the peg, on which the center board hangs, with shellac and one screw from outside surface of side. Then attach the second plywood side to the end pieces and drive a second screw into the opposite end of peg.

The completed trunk may now be installed in the hull permanently by driving screws into the whitewood side-pieces from outside of bottom. Space screws about one inch apart. A screw should also be driven into the bottom of each end piece from outside of boat. Be sure that all touching surfaces of hull and trunk are given a liberal application of glue or shellac before attaching.

All interior work complete, attach deck to sheer clamp with casein glue and screws spaced two inches apart and ¼-inch from outside edge of planking.

At this stage both bottom and deck overhang the sides of hull. Cut away the pro-

Drawing shows construction details, sail and rigging plan, centerboard trunk with working centerboard and pattern for rudder. Study your plans carefully before you actually begin building the model.



jecting surplus with a plane to within $\frac{1}{16}$-inch of the planking. Finish flush with sides with a No. 1 sandpaper block. Bevel edges to coincide with the sides of hull.

Fashion and attach deck clamp and coaming to inside of cockpit as per drawings.

Your hull is now ready to receive two coats of white paint on *all* outside surfaces. The deck is given a third coat of gray paint while the bottom is finished off in green up to the water line. The coaming, also, is finished in green. All surfaces may then be given a final coat of spar varnish. Of course if you prefer, the hull may be finished in the natural mahogany. In this case simply apply the spar varnish. Sand between coats with No. 0 sandpaper; before applying first coat sand bare wood with No. 1 sandpaper until the surface is satin-smooth.

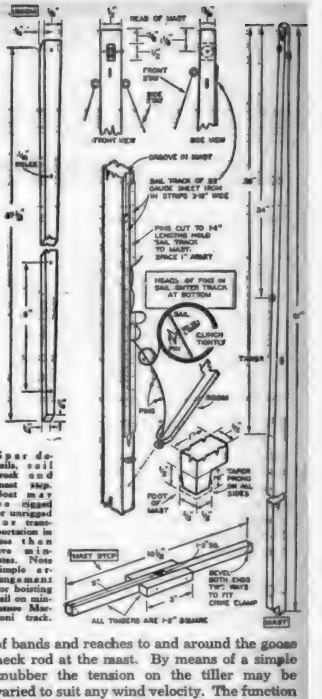
A rub-strake or fender of $\frac{1}{4}$-inch half-round trim is attached to each side, flush with the edge of deck. Taper the bow end, round off the stern end. Paint green while unattached and when dry give flat surface a coat of varnish and fasten to hull at once with short pins spaced three inches apart. Of course, attaching the rub-strake will take place after the hull has been painted.

Cinderella is equipped with two centerboards of widely different design. The smaller one is of the type which would be used in a real, full-size boat and is used principally for out-of-water exhibition purposes. Because of the absence of portable ballast in the form of passengers, a deep keel weighted with eight to ten pounds of lead at the bottom is necessary for model racing purposes. The lead may be attached in flat slabs with edges rounded off or a streamlined casting may be made.

To attach keel, insert upper front corner into slot in bottom of trunk until the notch in the front edge catches around the peg inside of the trunk. Then swing it back, that is so top edge moves upward into the trunk. A length of stout fish line tied to a screweye in the keel keeps it in desired position, the other end being wound around a cleat in cockpit.

If your model tends to head into the wind pull up on the center board cord. This will shift the center of lateral resistance back so that the boat will tend to swing away from a quartering head wind. The correct position for the C.L.R. in relation to the center of effort of the sails is indicated in the sail plan.

The automatic rudder is very simple. Rubber bands are attached to the tiller. A length of fish line is attached to the free ends



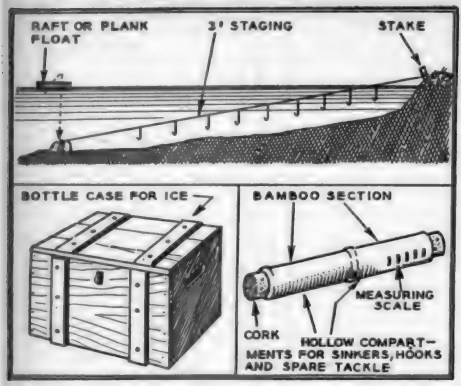
Spar details, sail track and mast step. Boat may be rigged or unrigged for transportation in less than five minutes. Note simple arrangement for hoisting sail on miniature Marconi mast.

of bands and reaches to and around the goose neck rod at the mast. By means of a simple snubber the tension on the tiller may be varied to suit any wind velocity. The function of this elastic tiller-to-mast cord is to keep the rudder straight under normal wind pressure on the sail; to allow the rudder to turn just enough to keep the boat on its course when a sudden gust of wind would otherwise swing the bow a bit off wind; and, to bring the rudder back to neutral when wind pressure is again normal.

BUILD FROM BLUEPRINTS!

Complete genuine heavy paper blueprints (drawn to exactly half-size) for CINDERELLA are available at $1.50 postpaid. Address Fawcett Publications, Inc., Greenwich, Conn., enclosing postal or express money order. DO NOT send cash through the mail.

New Angles For The Angler



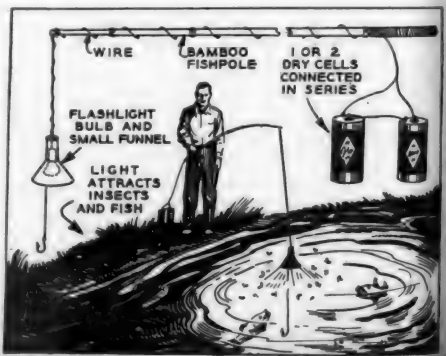
FOR the average fisherman who likes to go after catfish and pan fish here are a few suggestions for the overnight trip. Where it is necessary to get a trot line or throw line a considerable distance from the bank, without the danger of flying staging and hooks in casting, simply bind or nail two or three short sapling logs together, and float a large stone or heavy weight out on the current of the stream, jerking the weight off the float when the trot line becomes taut. Sections of boards or planks can be used for shorter lines. Use 3-foot staging tied at intervals to the main line.

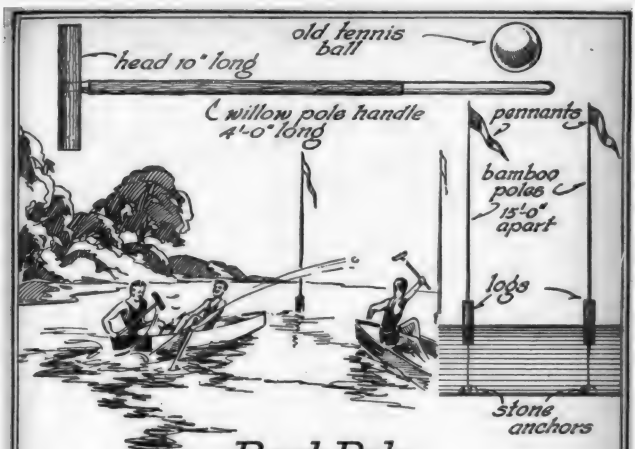
An old beer or bottle case makes an excellent ice box for the trip. Take along a cake of ice which fills about two-thirds of the box, packing live bait such as crawfish in grass against the ice. Meat, milk and cream or other foodstuff can be kept in the box after the bait has been removed from the box at camp. The ice supply will also provide iced drinks, and can be cracked up to put around dressed fish when the trip home is made.

A section of bamboo, 6 to 9 inches long, with a joint at the middle separating it into two compartments for hooks, sinkers and spare parts, provides a handy pocket case for the fisherman. Use corks to enclose the ends. File notches along one end of the bamboo for a measuring scale, checking them with a ruler. Measure those big ones with this.—*H.*

Light Aids In Night Fishing

THAT a fish can see and recognize a bug, together with the fact that he will be attracted by light makes the idea shown in the drawing a good one for those wishing to fish at night from the bank of a stream. Pole, hook and light may be one unit held by hand, or light pole can be stuck in the earth and line with hook lowered separately into the circle of light on the water.—*A. H. W.*





BOAT Polo has a lot of excitement and thrills, even for the fellows who row the boats. There must be at least two boats, although four or even six boats, divided into teams of two or three each, make the game more interesting. If you play on a narrow stream, a cord drawn across the stream will do for each goal line. If you play on a larger body of water, shove two bamboo poles in the water, 15 feet apart for each goal. If the water is deep, anchor two log sections, 2 feet long, with rope and stones on the bottom.

Bore holes in the top of each log and firmly set the base of a 10 or 12 foot bamboo pole in each log, tying pieces of colored cloth to the tips of the poles for pennants. Each boat has an oarsman and a mallet-man. The mallet-man may sit in either the stern or prow of the boat, but cannot change positions during the game. The sets of goal posts, or lines across the narrow stream, should be about 20 yards apart, for the playing area. Make the mallets from pine blocks, whittled or planed in a cylindrical shape and 10-ins. long and 2-ins. across at the ends. Use old broom handles for the mallet handles, nailing them in holes bored at the middle of the mallet head. The ball may be an old tennis ball or air-filled rubber ball, from 3 to 5-ins. in diameter.

The boats and crews of each team assemble under their particular goal posts or poles, or on a line with their goal, facing the other team across the water field. A referee rows to the middle of the field between goals and drops the ball. Then he gives the signal to the opposing teams and they immediately dash by boat to the middle of the field. The first boat to reach the ball sends the ball with a sweep of the mallet toward the opponent's goal. Only the mallet-man can strike at the ball, the oarsman maneuvering in such a way as to bring his boat near the ball so that his mallet-man can strike it. Another stunt is to row across the path of an opponent, to keep him from the ball. In this way the ball is driven back and forth until it is worked near a goal, and driven between the poles or under the line, scoring 10 points. A penalty of 5 points is given the team whose men hold the side of another boat to keep it from closing in on the ball. The game ends when one team scores a total of 50 points, with penalties deducted.—*V. H.*

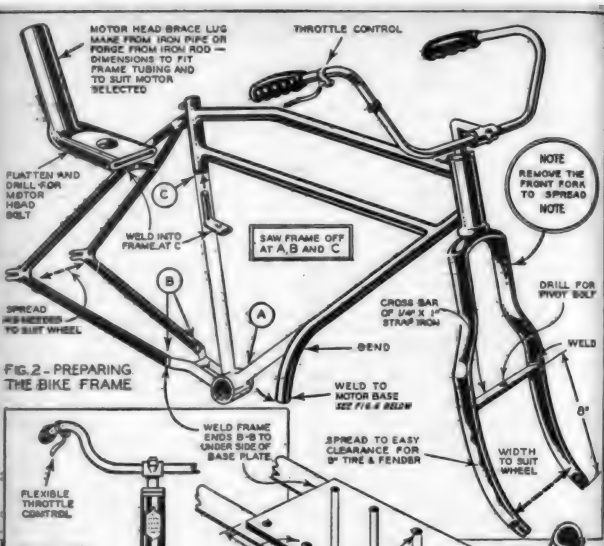


FIG. 2 - PREPARING THE BIKE FRAME

FIG. 3 - ASSEMBLY AT FRONT FORKS*

* NOT SHOWN IN TRUE SCALE

FIG. 4 - MOTOR BASE

[Continued from page 81]

this point and pivoted fork brace of strap iron or tubing. This fastens to the fork cross bar with a bolt and a spring of about 1 to 1½ inches long. The other end extends to the foot rest brace.

Figs. 6 and 7 show front and rear axle assemblies. Rear wheel sprocket is a ½x½ inch pitch bicycle sprocket and old motorcycle brake drum attachment uses spacing sleeve made of pipe. An ordinary bolt holds it in place. Front and rear axles themselves can be made from an old ¾-inch diameter steering post turned down at the ends to ½ inch to allow passage through forks, or standard axles may be purchased.

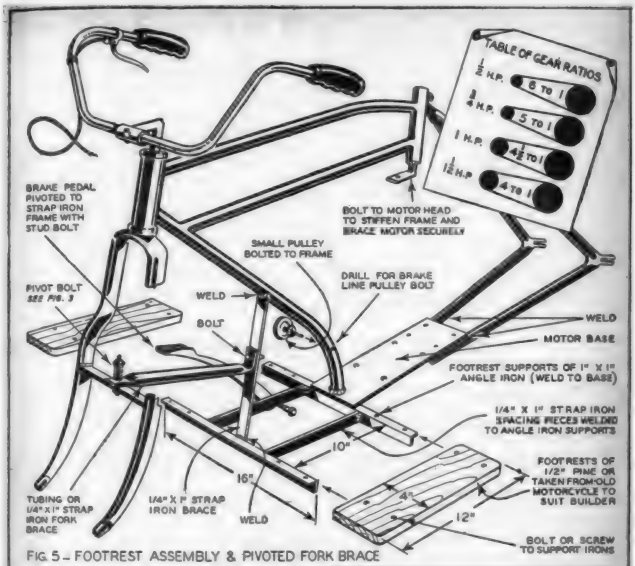


FIG. 5 – FOOTREST ASSEMBLY & PIVOTED FORK BRACE

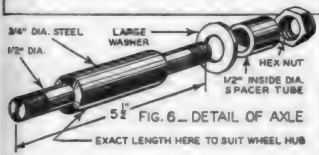


FIG. 6 – DETAIL OF AXLE

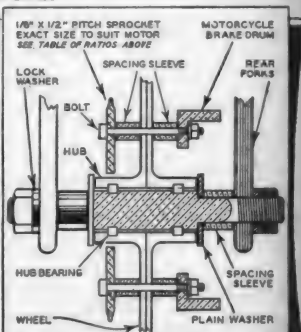
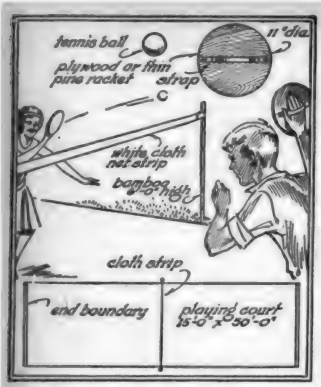


FIG. 7 CROSS-SECTION THRU REAR HUB

Fenders are optional with the builder and can be made any way he wishes. Any motor of ½ to 1½ horsepower using a direct chain drive is suitable. This type drive is simple and trouble-free. A slight push will start the motor and in stopping the latter acts as a drag as soon as it is throttled down, stopping the bike more quickly than if it were de-clutched. Fuel tank can be located below or above the carburetor, according to the type of carburetor used. The engine control is located on the handlebar. A satisfactory gear-ratio table is shown in inset, Fig. 5. Note that the gear ratio decreases (gears come closer to equal size) as the horsepower increases.



Bat Volley Ball

YOU need but two or more rackets, sawed out of thin boards, an old tennis ball, and a strip of cloth suspended between two bamboo or willow poles for this active and exciting game. Lay out the court on the lawn or back yard, making it about 15 or 20 feet wide and 50 feet long. If the court is on the lawn, use narrow strips of white cloth pinned together for the end and side boundaries, pinning the strips in a straight line against the sod with pieces of wire bent in the shape of a U. At the middle of the court shove two willow or bamboo poles in the side boundary lines, one on each side. The poles should be 6 feet above the ground. Rip strips of white cloth 6 inches wide from old flour sacks or rags, stitching them together to form a net strip long enough to stretch between the tops of the poles, to which the ends of the finished net strip are tacked. Each racket is sawed from plywood or thin pine boards, and is 11 inches in diameter. Tack a cloth strap or skate strap to the back to serve as a handle. One, two or three persons can play on each of the two teams. The game is played as follows:

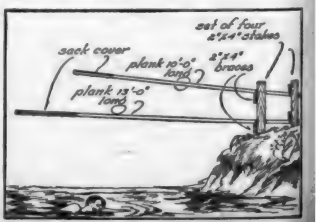
A player on the team serving first steps just back of the end boundary line, in his or her half of the court, and bats the ball with the racket so that the ball goes into the opposite court, over the net. Players on the other team then bat the ball back, and the ball

GAMES FOR

crosses back and forth over the net until one of the following things occurs: the ball may be returned *under* the net, go out of bounds, or strike the ground *before* crossing the net. When one of these things occurs, the opposite team collects one point, and one of the players on that team serves the ball again from back of the end boundary. If more than one person plays on a team, the players take turns serving. After playing the game for a while, you will learn to drive the ball to difficult positions on the opposite court, such as the corners or just over the net. Often a player is drawn out of position and affords you an opportunity to send the ball to that place. The team which first reaches a total of 25 points wins the game.

Double-Action Diving Board

YOU can get a lot of action in your dives with this double board. Drive two two-by-four stakes into the bank, setting them a little over 1 ft. apart. Back 3 or 4 ft. from the stakes drive another set, making sure they are set deep in the ground. Saw out 4 cross-pieces from a 2x4 and nail one a few inches below the top of the forward stakes, with the plank resting upon the cross-piece. Nail the cross-piece at the top of the rear stakes, with the plank fastened underneath. Spike the plank to the stakes and cross-pieces to secure it, bringing the plank up at a slight angle. 2 ft. below the plank nail another set of cross-pieces or braces to the stakes, and fasten the lower plank through them, securing it as you did the other. The upper plank should be about 10 ft. long, and the lower one 13 ft. long. Cover the ends of the planks with old sacks, tacked along the underside, to provide a good foot-hold.



SUMMER

Crazy Horse-Shoe

THIS is a hazard game game played with horse-shoes, in which you must toss your shoe through boxes and barrels, over back-stops and peg rings, and get a "ringer" before it counts. It is a lot of fun and you and your friends will enjoy it. The course is laid out as shown in the drawing, with nine stakes representing the nine holes as in golf. Each hazard should be about 25 ft. from the next one. No. 1 stake is 2 ft. back of an open board box, held a few inches above ground by stakes or boards. The open ends of the box should be from 2 to 3 ft. square. No. 2 is a barrel or large keg, open at both ends, and suspended about 18 inches above the ground, with the stake driven in the ground directly underneath. Drive stakes in the ground and fasten them to the sides of the barrel with nails. No. 3 is a board or plank about 1 foot wide and 3 ft. long, placed over a box with one end staked to the ground. The horse-shoe stake is on a line with the board and 4 ft. from the tilted end. No. 4 is a post set in the ground 4 ft. high, with a long bolt driven in the upper end for the horse-shoe stake. No. 5 is a back-stop about 3 or 4 ft. square, made from boards nailed together with cleats across the ends and driven into the ground. The stake is about 5 ft. beyond the back-stop. No. 6 is the same as No. 4. No. 7 is a ring of stakes, about 3 ft. in diameter, driven in the ground, with the horse-shoe stake in the center of the ring. No. 8 is a back-stop in two sections set together at an angle as shown, and made from boards nailed together with cleats across the ends. The stake is about 3 ft. to one side, and the object is to make the horse-shoe strike the back-stop and ring the stake. No. 9 is a stake at the back side of a box laid on the ground.

Each player uses four horse-shoes. Beginning at or near No. 9 stake, you throw through the box for No. 1, taking three throws and collecting the shoes. The next player tosses his three horse-shoes, and so on, and each player must count his tosses, for he may take his turn several times before getting a ringer. On No. 2 you must drop the shoe through the barrel upon the stake. No. 3 requires you to roll the shoes along the board and off the end to get ringer. Nos. 4 and 6 are difficult for you must leave the ringer on the bolt at the top of the post. The bolt should be a long one. On 5 you must "shoot blind" for the stake. No. 7 is quite easy. No. 8 is a "bank" shot and is hard to make. No. 9 is another "blind" shot. All tosses are made from spots near the stakes, to the next stake, and are indicated by circles. After all players have "rung" the ninth stake, scores are counted to find the lowest score and the winner.—*G. E. Van Horn.*

FEATURED NEXT MONTH

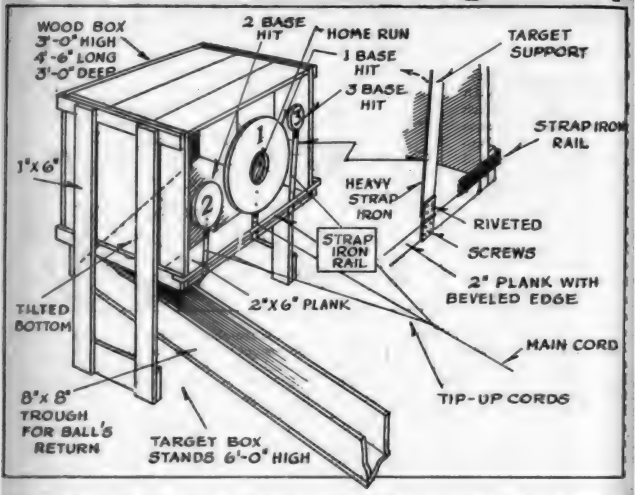
The September issue of MECHANIX ILLUSTRATED will be even bigger than the present one and will carry more articles than ever for the model and workshop fan.

Complete plans will be given for *Yumping Yimminy*, a 27-inch streamlined model speedboat powered by a miniature gasoline engine. Also plans for class A and B contest gliders.

For water sport enthusiasts a new, exciting pastime—how to build and use a pair of water skis, with lessons by a world famous water ski expert!

Also many excellent projects and suggestions for the home workshopper.

Build A Baseball Pitching Gallery

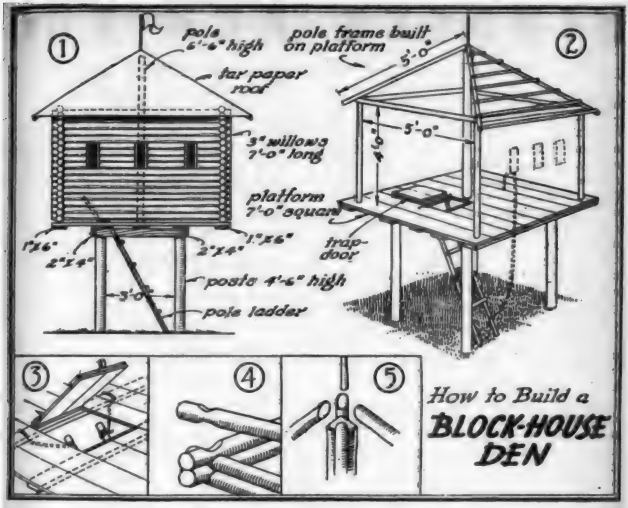


THE pitching gallery shown in the sketch enables you to play a full nine inning ball game against an opposing pitcher, without the diamond and other players. Set up the gallery in the back yard, buy three or four dime balls or collect a few old baseballs, and enjoy a game on the gallery.

For the box you will need a large dry-goods box about 4½ feet long, 3 feet high and 3 feet deep. Nail a pair of 1x6-in. legs to each end, raising the top of the box to a position 6 feet above the ground. Nail sections of a wide board across each pair of legs at the base, to brace them. The front of the box should be open. Remove the nails from the bottom boards at one end, leaving the other end nailed. Construct a trough conveyor for return balls, using 1x8-in. boards, 10 or 12 feet in length. Leave one side at the upper end of the trough open, nailing the lower end of the slanting bottom to the bottom of the trough. Enclose the openings formed where the bottom meets the trough, with boards, so that the balls, striking the padded wall at the back of the box will drop on the tilted bottom, and roll down the trough, where they can be easily retrieved by the pitcher. Tack folded sections of gunny sack to the ends and back of the box, and to the tilted section of the bottom.

The target rack consists of three wooden targets, all of hardwood. The largest, 16-ins. in diameter, has a 6-in. opening cut in the center. This target is numbered (1) in black paint, and represents a one base hit when it is knocked down. The small opening in the center is covered at the back of the target with a square of red cardboard, hung on a nail. A home run is given to you if you knock the cardboard from the bull's-eye. The two-base target is 11-ins. in diameter, and the smallest target or three-base disc is 8-ins. in diameter. Slightly bevel one edge of a 2x6-in. board, and nail it between the ends of the box, the beveled edge flush with the front edges of the box at the bottom. The target supports are 1-in. strips of heavy strap iron, secured to the wood targets with screws fastened through two holes drilled in the iron.

[Continued on page 127]



How to Build a BLOCK-HOUSE DEN

MAKE a Block-house Fort for your den or camping shelter, with a "draw-bridge" ladder and trap door so that only those knowing the password can get in! It costs very little to build, since scrap boards can be used for the platform floor and willow poles cut for the walls and roof. Select the site of the block-house, and dig four holes for the support posts, which are about 7 feet long and from 6 to 8 inches thick. The posts are set in a square, about 3 feet apart, and the earth must be tamped down hard to hold them securely erect, from 4½ to 5 feet above the ground. Nail lengths of two-by-fours or about poles around the top of the posts. Make the floor platform 7 feet square, using scrap boards or trimmed willow poles nailed together. Across the boards or poles on the underside nail five one-by-six boards as shown, to strengthen the platform. Leave an opening for the trap door, 20 inches square. The one-by-six cleats under the floor should be 18 inches apart under the trap door, so that the ends of the door will rest on them when closed, supporting the closed door (Fig. 3).

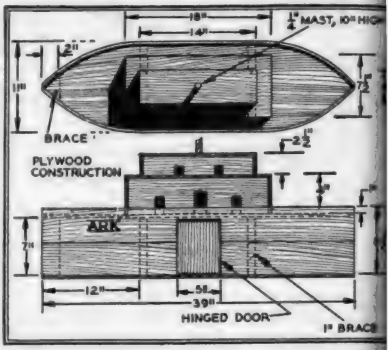
Make the trap door from two boards to fit the opening, nailing boards across the ends and fastening the door to the floor with two hinges. Nail a piece of leather strap to the other end, in order to lift the door. If you can find a clump of willows from which to cut poles or "logs" 3 or 4 inches thick, you will not need the pole frame for the walls (Fig. 2). If poles from 1½ to 2 inches thick are used, you should nail four poles, each 4 feet high, near the platform corners, nailing pole rails across the top. Cut the "logs" in 7-foot lengths, cutting notches 3 inches from the ends and laying them together at right angles (Fig. 4). Each notch should be about one-fourth the thickness of the pole so that they will fit together. Small-sized poles should be nailed to the pole frame at the corners, but the larger poles are fastened together by driving a nail into the corner joint each time a layer of "logs" is laid. Cut openings 8 inches wide and 12 inches high in the logs for the loop holes, nailing boards across the ends of the poles to hold them together and form the frames of the loop holes.

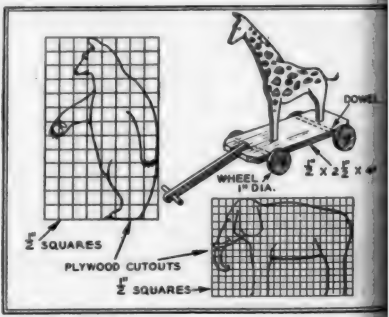
[Continued on page 129]

KIDDIES ARK ZO

by Everett Van Horn

SOMEBODY'S youngster will be very pleased with this complete Ark and family of animals! Constructed almost entirely of plywood, the set is inexpensive and easy to make. The Ark consists of a hull, 39 or 40 inches long, about 8¾ inches deep and with a beam of 11 inches. Use water-soaked strips of plywood for the hull or shell, these being warped around two braces (indicated by dotted lines), and fastened to the two triangular braces at the ends. The middle braces are 1 inch boards cut to fit between the sides of the hull. The deck and bottom are cut from single boards and fitted in place, while the upper structure is also cut from plywood and assembled with finishing nails as shown. Cut openings for a door and windows in each side and use a ¼-inch dowel, set in a hole bored through the upper structure to reach about 10 inches above the deck. Fasten a door 5 inches wide and 7 inches high in an opening cut in the side of the Ark, hinging the upper end with screw-eyes or small hinges. The outside of the Ark can be painted in two or three bright colors, and the tip of the mast fitted with a bright red pennant.





The animal cut-outs are made on the jig-saw, three-ply or five-ply plywood being used. The carts are ⅛ by 2½ by 4-inch boards, the corners knocked off, and a slot cut in the front edge for the end of the tongue, which is secured with a long nail driven through the block. The wheels are slices of 1-inch dowel, with holes bored through the center to take ⅛-inch dowels which are used for axles, and stapled to the underside of the block. The wheels should turn freely on the dowel axles, and are held in place with small brads or tacks in the ends. Two suggestions are given for animal cut-outs. Others can be made easily by finding several good prints or pictures of animals and copying them or dividing them into squares so that you can use this same in tracing the outline upon the plywood before cutting it out. Fasten the cutouts to the cart with small screws from the underside. Enamel the figures in realistic colors and trim. With black, white, yellow, red and blue colors you can mix a variety of tones for decorating the animals with camels-hair brushes.

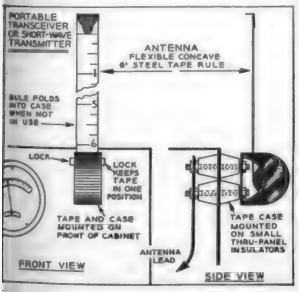
After you have finished coloring the animals, give them two coats of varnish.

Individual Panels

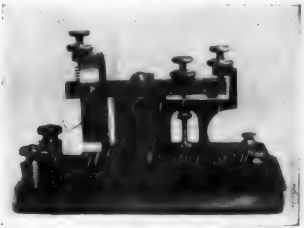
EXPERIMENTAL short-wave receivers and transmitters using "breadboard" style construction can be improved considerably by the use of individual little panels of Bakelite, for such important units as tuning condensers, high-voltage switches, etc. These can be mounted very easily by wood screws along the bottom edge. Removal is then a simple matter. Small pieces of Bakelite suitable for the purpose can be cut from old panels or purchased new at low prices. Thicknesses of ⅛ or $\frac{3}{16}$" are satisfactory.—*R. H.*

Steel Tape Antenna

A STEEL rule of the concave, collapsible type makes an excellent antenna for portable radio sets. It is especially convenient for transmitters, since the radiating portion can be adjusted quickly to the exact desired length. Depending on the construction of the cabinet of the portable outfit, the case of the rule can be mounted inside or outside. Two "midget" size feed-through insulators make an excellent support.—*H. R. Wallin.*



Keying Relay From Sounder

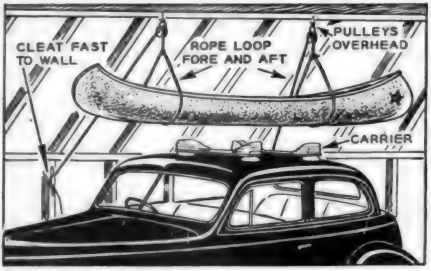


OLD-FASHIONED telegraph sounders, obtainable now at bargain prices, can be rebuilt to make sturdy keying relays for short-wave transmitters. Replace the heavy brass sub-base by a piece of hard rubber or Bakelite, using the brass base as a drilling template. With a hacksaw or file, cut a notch in the end of the striking bar and fasten a bit of Bakelite here with a machine screw (from the bottom). The purpose of these Bakelite pieces is to insulate the striking bar from the anvil. Drill and tap a hole in the latter directly under the adjustable striking screw, and insert a sharpened screw with a binding post top to act as a lock nut.

Mount two binding posts on the right side of the new Bakelite sub-base. Connect one to the anvil, the other to the U-shaped yoke that supports the striking bar. This relay is giving good service with a 100 watt transmitter.—*R. H.*

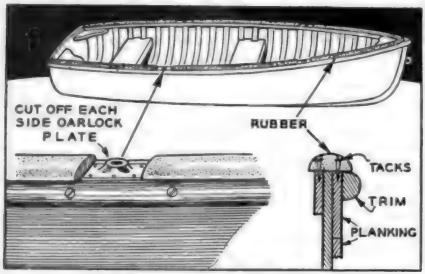
Meter Boxes Of Plywood

MOUNT your loose meters in individual boxes, made from scrap ¼" plywood, and protect them from injury. The scales will be easier to read if the front panel is cut at an angle.—*R. H.*



Garage Boat Hoist

NOW that many fairly heavy boats are carried to and from the water atop cars, pulleys and ropes fitted to the rafters of the garage simplify the work. The rope loops suspended from the rafters are merely slipped about the boat, one at the bow, the other near the stern, the ropes pulled on one at a time to raise the boat a foot above the top of the car, then made fast to cleats on the walls. You can drive out and in with the boat there, and even leave it hung in its slings for the winter. When you want the boat all that is necessary is to lower one end at a time down onto the carrier, slip the loops and drive out. This method works just as well if you carry the boat upside down on the car top.

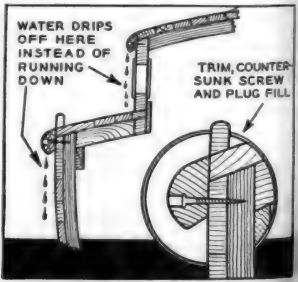


Saving Car Top

HALF-ROUND rubber bumper or rub strake stock, for sale by any marine hardware store should be used atop the gunwales of a small boat of the portable type carried atop a car or trailer. Protected thus the boat may be loaded upside down or slid on the car without marring the top's finish either during the loading or later on the road. Strake may be fastened to gunwales with tacks or screws.

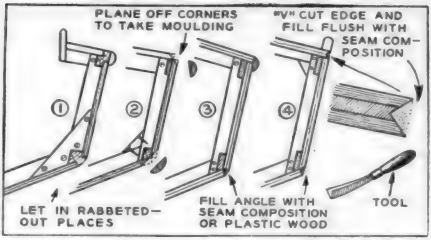
Molding Avoids Streaks

IF TRIM around the cabin or deck is shaped as shown and set in white lead or liquid marine glue those unsightly dirt streaks which appear down the cabin sides and hull after every rain will be avoided. Much of the rain water laden with soot and dust from the decks and cabin top will then drip off the lid of the trim instead of running under and down. Such trim can be planed out from square or rectangular stock, or heavy half-round used and the lower edge planed away as shown. Be sure to fasten with brass screws to avoid chance of rust stains from the fastenings. And set in white lead to insure a watertight fit.



Boat Fans

Protecting Plywood Edges

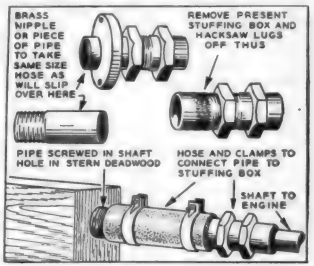


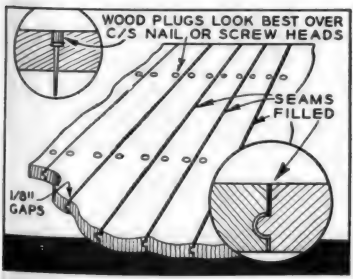
WHEN waterproof plywood (only suitable type) is used in boat building its edges should be protected in some way. These will not open up but the alternate layers of grain will work slightly as the wood shrinks and swells in wet and dry weather. This leaves the edges rough and prevents paint from holding; they are also easily splintered whenever they come in contact with anything.

In Fig. 1 the edges of the decks, side and bottom panels are set in glue or paint in rabbeted pieces of oak. Fig. 2 shows them chamfered off with a plane after being fastened, then covered with shaped pieces of molding screw fastened down in marine glue or white lead. In 3 the edges are left to form an angle into which seam composition or white lead putty is worked even with the corner. In 4 the edges are V-d out then filled.

Self-Aligning Stuffing Box

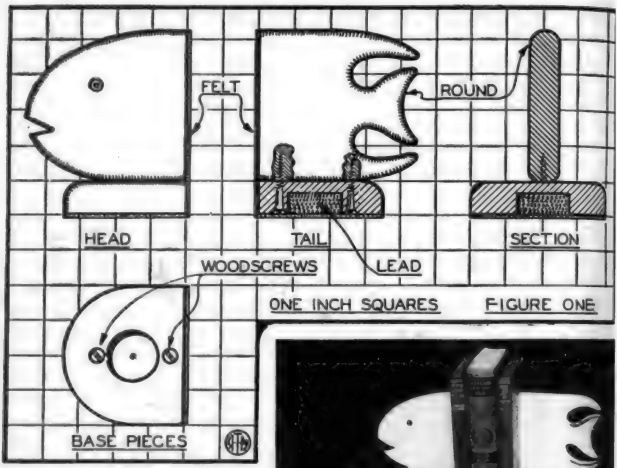
YOUR present stuffing box, if the usual style, can easily be changed over to a rubber cushioned type to make up for slight engine misalignment. Remove box and hacksaw off projecting lugs, then file smooth. Secure a 6-in. length of heavy rubber hose to slip over the end of the stuffing box, with two hose clamps to fit. Then get a brass nipple or piece of pipe, threaded at one end, the same size. Ream out the shaft alley or hole in the deadwood until the pipe can be screwed in tightly in white lead. Slip the end of the hose over it, the other over the stuffing box, set up the clamps and it is ready to take the shaft and be packed.





Shipshape Floors

FOR a "shippy" looking cabin or cockpit floor use common tongue and groove fir or pine, well air seasoned. Lay this so there is a 1/8 or 1/4-inch opening between every two boards. After sanding well, clean cracks of sawdust and dirt and give the surface two coats of varnish, being careful none gets down in the cracks. When dry fill the seams with black seam composition forcing it in with a putty knife. Contrast between bright varnished wood and black seams is good-looking.—*J. Emmett.*



Fish Bookends:

A One Evening Project

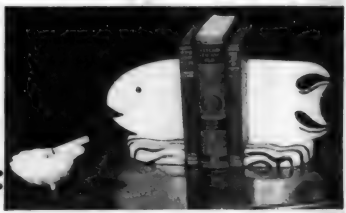
HERE are novel piscatorial bookends, designed in the latest mode, so simple in construction that only one evening will be required to make them and the quantity of materials is so slight that the cost of the project is practically nothing.

The pair illustrated is finished in blue and white enamel but this design is very attractive in natural mahogany, maple or black walnut. So choose the wood to match the surroundings.

On a piece of 1-in. stock 4½-in. wide and 9-in. long lay out the pattern of the fish as shown in the drawing. Cut out the design on the jig saw. Then using a wood-rasp round off all edges, especially at the tail, which should be quite delicately fashioned. Sand all of these edges smooth using emery cloth at the inside cuts as shown in the lower photo. When this is done saw the fish in half and sand the cut.

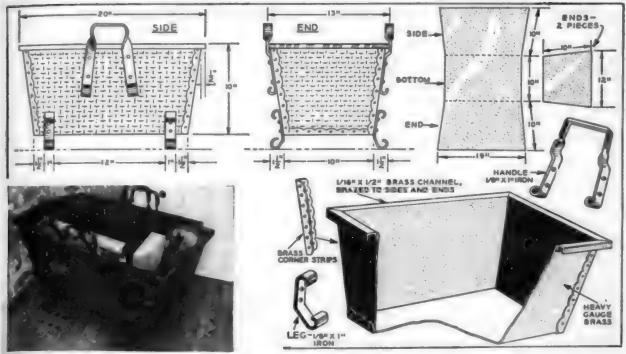
Now cut out the two base pieces from 1-in. stock 3½x4-in. and round the upper edges as above. Drill a 1½-in. hole in the bottom of each of these pieces to a depth of ¾-in. Drill and countersink two holes in these pieces to receive woodscrews. Screw the bases to the halves of the fish using glue at the joint. Melt some lead and pour into the holes in the base pieces. If an enameled finish is required shellac

[*Continued on page 114*]



Completed bookends are shown above performing their duty. Bases are lead-weighted and wavy lines represent wood.

PORTABLE WOOD BOX IN BRASS



THIS portable woodbox is no heavier than a substantial oak carrier of equal capacity, and is exceptionally strong. The compartment is made of two end pieces of sheet brass of suitable gauge, and the sides and bottom in one piece. The rim is brass channel mitered at the corners and brazed to the sides and ends. Ornamental strips are riveted to the corners, as shown. Legs and handles are bent from flat bar iron and riveted in place. Corner strips may be of copper if you prefer. The box will hold a considerable amount of cut wood or kindling and makes an attractive addition to the fireplace.—*Hi Sibley.*

Curtain "Tie-back" And Glass Make Wall Bouquet Holder

A TEN cent ornamental "tie-back" can be converted into a useful and decorative wall vase for flowers. A glass or jar will slip snugly right behind the leaf design of the curtain holder, and a plain piece of undecorated metal at the rear of the assembly acts to hold it constantly in place. Since the metal has some spring to it, the jar will not fall out. The metal also has holes drilled in it at the factory, and these may be used to fasten the assembly to the wall.—*Herbert Hayden.*

EVEREADY CASE For

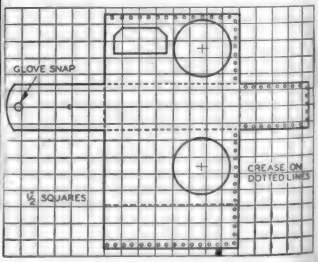
The meter is used in the ordinary manner, without the necessity of replacing it in a case each time.

IT WAS in the early days of the miniature camera that the need for an always-ready-for-action case was realized, and because it really does save time in emergencies, the "eveready" has continually grown in popularity. During the same period of time, the electronic exposure meter has likewise become popular and its practical need well established. There does not appear to be an eveready case on the market for the meter, however. The camera case is readily snapped open for action, but one must fumble with a quite ordinary case and withdraw the meter before the camera shutter can be accurately set.

A substantial case is of course a necessity when the meter is to be packed away or laid aside, in order to protect the several windows and dial. The eveready case described here is not intended to replace the one supplied by the manufacturer, but rather to supplement it. The meter is transferred to the eveready when it is to be carried on the person and when action with the camera may be expected at any moment. It affords a certain protection to the meter, particularly against bumps and shocks, and against marring or damage to the Bakelite or plastic housing. The latter *can* become cracked. The cell and meter windows, as well as the calculator dial, are also less likely to receive damage, although they are not covered. The case is truly ever ready for action.

The case shown in the illustrations is for the standard Weston meter and is easily fabricated from 4- or 6-ounce cowhide. Heavier leather may be used if it is cut into

Cutting the leather from a larger piece (see pattern). A disc is also cut for the lacing thongs.



Your Exposure Meter

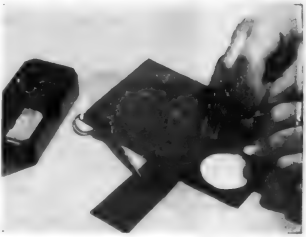
several parts, then laced together. The present design is of one-piece construction.

It is advisable to first make a paper pattern, following that in the drawing, and to try the pattern around the meter to assure an exact fit. It must be remembered that the leather is of heavier weight than the paper, and allowance made. Transfer the pattern to the leather by means of carbon paper, then cut it out with the corner of a single-edge razor blade. The use of any type of scissors will result in ragged edges.

Before proceeding further, the edges of the leather must be reinforced by cementing narrow strips of the same material adjoining the window openings. Coat each surface with cellulose cement, allow it to dry thoroughly, apply another coat and then press together.

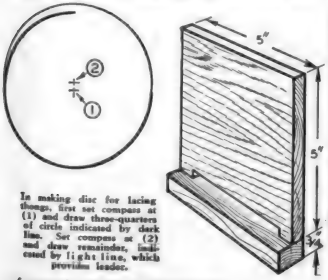
In the one-piece construction it is desirable to crease the leather to shape, and this is easily accomplished by dampening it with water, folding, and clamping tightly between two smooth pieces of wood in a vise for some time. Do not use too much water, and allow the leather to become almost dry before unclamping.

An ordinary ticket punch is not well suited for the making of lacing holes, and if you do not have an ordinary hollow punch, it is best to take the leather to a shoe repair shop for this operation. Space the holes about ¼-in. apart. At the same shop you can have a glove snap fastener attached. Leather laces can be purchased or you may cut them yourself from the same leather as is used for the case. Cut the leather disc after first outlining it with a compass, as shown in the



In cutting the three windows, use the corner of a sharp razor blade in preference to any other tool.

Reinforcing parts of the case with narrow strips of the leather, which are attached with cement.



In making disc for lacing thongs, first set compass at (1) and draw three-quarters of circle indicated by dark line. Set compass at (2) and draw remainder, indicated by light line, which provides leader.

Creasing the leather in a vise, so that it will fit around the meter snugly and hold its shape permanently.

Punching holes for the laces. A regular leather punch must be used, as a ticket punch is not sharp enough.

With this simple jig, a single disc of leather can be cut into one long lace.

drawing, to provide a starting point. Place the disc on the jig, adjust the knife for the thickness of the cut, then pull gently on the starting end. The disc will revolve as the lace is pared from its edge and with a little care it is not difficult to make perfect laces with this method. Lace the case together as neatly as possible, and it is ready for use.

To make a slightly more decorative and flashy job you can buy strips of rawhide for the laces, instead of cutting them from the same piece as the case. The rawhide can be had in a number of different tones, and you can select the one that makes a pleasing contrast to the case itself.

It is also a good idea to apply saddle soap or other leather softener and preservative to the case upon completion, as this will greatly prolong its life and appearance.

As stated before, the case shown was designed for a Weston exposure meter, but by slightly varying the pattern it can be made to fit any of the standard meters on the market. Simply alter the outlines of the cut-outs to suit your particular meter.

Dodging Contact Prints

HERE is a way to secure greater control in contact printing of negatives which require "dodging" to bring out their best qualities: Paper and negative should be placed face to face in perfect contact as usual and set in the light field of an enlarger. The enlarger head should then be brought down so that the material to be printed is completely covered by light, with the minimum excess.

Experience has shown that the printing time necessary with this set-up is about the same as that required by the average printing-box. The great advantage of this method of contact printing, as shown in the accompanying photograph, is that it permits dodging in exactly the same way as used in making enlargements.—*Gene Cowan.*

Negative Seals Bottle Cap

BOTTLES with screw caps are useful for storing developer but the thin lining of the cap generally lasts only a short time. With a compass, cut some discs from an old negative, to fit inside the bottle caps. They will serve indefinitely, especially if coated on both sides with paraffin.

Novel Interval Timer

FOR the timing of darkroom operations, an hour-glass type of egg timer, which rings a bell after a predetermined period, has many uses. The one shown may be set for different periods of time and is of course absolutely accurate.

Curl-Preventing Liquids

APPLY these to the backs of prints without loss of time by using an ordinary 15c spray gun such as are sold for dispensing insect destroyers. In the case of glossy prints, spray the backs while they are on the ferrotype tin.—*K. M.*

Table-Top Background

THE occasional need for a simple background for table-top photography is easily solved by building a wood frame 25x38-ins. and using a piece of No. 30 binder's board. This is heavy enough to eliminate the need of a top piece to the frame. It is inexpensive, in fact almost any printer has it as scrap for paper companies use it in bundling up fine papers. The grayish color does not throw the light back at the camera as a white background will.

In this department the photography editor will answer any questions or problems relating to cameras of all types, enlarging, developing, printing, taking pictures, and the various phases of home movie making. When sending questions to this department be sure to include a self-addressed, stamped envelope so that we can answer directly in case space does not permit answering in this page. Send inquiries to Photography Editor, MECHANIX ILLUSTRATED, 1501 Broadway, New York, N. Y.

OVER-DATED ENLARGING PAPER

Q. What happens to a print when over-dated paper is used?—H. W. Schwerman, Edmonton, Canada.

A. Paper that is over-dated is likely to fog. The effect is a grayness around the edges of the print as well as a print that is not sharp and does not have clear tones. (Fresh paper should develop with clear white edges.) If you have over-dated paper, it is always advisable to test a sheet. If it has been kept in a cool, dry place away from chemicals, there is a possibility that it is good even after the expiration date.

SHORT FOCUS LENS

Q. I have an enlarger designed for 4x5 negatives. It uses a 3½-in. lens. When I try to enlarge 35mm film, the enlargement possibilities are limited. What sort of lens would make greater blow-ups possible?—Alex McIntosh, Detroit.

A. The number of times a 35mm negative can be blown up when used in an enlarger designed for larger film (and using a long focus lens) is considerably limited. One way to correct this difficulty is to use a shorter focus lens. A lens of two or even three inches in focal length would enable you to make larger blow-ups.

FILTER FACTOR

Q. I have heard a lot lately about the "filter factor." What does that term mean?—Charles Little, San Francisco, Calif.

A. The purpose of a filter is to absorb or hold back certain wave lengths of color of light and to transmit other wave lengths. The colors transmitted will photograph darker and those absorbed will photograph lighter. As part of the actinic light is prevented from reaching the film, the length of the exposure must necessarily be increased. The "filter factor" is the number of times the exposure must be increased over the exposure when no filter is used. The "time" varies with the type filter and film.

"WARPED" PRINTS

Q. Whenever I ferrotype prints, they come off the plate "warped" and will not remain flat. What causes this condition?—H. L. Evans, New Holland, Penn.

A. Prints sometimes dry "warped" because they were stretched. What happens is that wet prints stretch when squeegeed hard and they shrink irregularly as they dry. The remedy is to squeegee prints lightly and evenly without pulling more in one direction than in another. The length of time it takes prints to dry depends on the amount of heat to which they are subjected. Under good working conditions, prints will dry and peel off ferrotype tins in about five minutes.

HOT WEATHER PROCESSING

Q. Is there any other method for doing hot weather processing besides using ice or some artificial refrigerant?—C. B. Elliot, Hollywood, Florida.

A. Hot weather processing may be done by using a double tray and packing the outer one with ice or filling it with water, or you could use any one of the special hot weather developers available on the market. In a pinch, it is possible to do your processing in hot weather simply by maintaining the developer, hypo and wash water at one temperature. It is not so much the temperature as it is the differences in temperature between the various solutions that damages film during hot weather processing.

CAMERA CASE RECONDITIONER

Q. What's a good solution or polish to use on a worn and dry leather camera case?—F. G. Ketter, Chicago, Ill.

A. A formula for a good polish can be made from 30 parts of lanolin, 40 parts of castor oil and 5 parts each of sodium stearate and Japan wax. Rub the resulting liquid into the leather with a soft cloth. If you wish to buy ready mixed soap, Propert's Saddle Soap is very good and inexpensive.

WAXING FINISHED PRINTS

Q. What material is used to give a sheen to exhibition prints?—Clyde Norman, Des Moines, Iowa.

A. Lustre on prints has the tendency to make them more brilliant; frequently improves their effect. Mix this surface solution from the following: 8 oz. benzol, 1 oz. beeswax, ½ oz. rosin, 2 oz. turpentine. Pour a small amount of this solution on the print and rub it in with a soft cloth. When the entire print has been coated, polish dry with a wad of cotton or soft cloth.

QUICK DRYING NEGATIVES

Q. What is an effective method for drying negatives quickly?—A. J. Franklin, Jacksonville, Fla.

A. If you soak a negative, after it has been thoroughly washed, in two successive baths of methylated spirit containing 10 per cent of water and then place the negative in a stream of clean air, quick drying results. Care must be taken, however, that the air stream is dust free. The film need only remain in the bath a few seconds.

STOPPING SINK LEAKS

Q. How may darkroom-sink leaks be stopped effectively? —Frank Potter, Wilkes Barre, Penn.

A. You can mix your own compound that will stop sink leaks effectively. Use 34 parts of asphalt, 26 parts of kerosene and 40 parts of asbestos meal. Dissolve the asphalt in the kerosene, then pour in the asbestos powder slowly until a thick putty results. Apply this paste over the cracks and it will dry hard and water-proof and will last a long time.

STOP BATH

Q. What should be used for a stop bath for prints?—C. T. Hilpert, Cleveland.

A. A 28 per cent solution of acetic acid makes an excellent stock solution for a short stop bath. In use, the 28 per cent acetic acid should be diluted with water in the ratio of 1½ oz. of acetic to 32 ozs. of water. (To make 28 per cent acetic acid from glacial acetic, dilute three parts of glacial acid with 8 parts of water.)

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Kodak 35's make 35 mm. negatives that, through modern photofinishing methods, yield big 2¼x4-inch black-and-white prints. Have fast lenses, precision shutters, eye-level finders, finger-tip focusing, automatic exposure counter. Load with Kodachrome (full-color) Film as well as black-and-white.

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Rustic Salt and Pepper Set

HERE is a novel little "rustic" salt and pepper set, made from bark, and set upon a server made of a thin slab of wood with the bark left on! Many kinds of small saplings have bark that may be easily removed, especially during the early spring months when the sap is beginning to rise. Maple, willow, hickory, and many others are suitable. Select a section of the wood in which the bark is entirely free from small knots, twigs, or other blemishes.

Cut a couple of lengths of the wood, about an inch and a quarter in diameter by three or four inches long, and smooth the ends with a sharp knife. One end should be rounded off slightly to form the top of the shaker. Gently pound the bark all around with a wooden mallet to loosen it from the wood, and slip it off.

You will now have a couple of cylinders of bark. The tops and bottoms of the shakers are made by cutting ¾-in. discs from the ends of the wooden pieces that you removed from the bark, and fastening into the ends of the bark cylinders with glue. The discs that are to serve as the perforated tops should be a little thicker than the bottom pieces, and drilled with six or eight small holes.

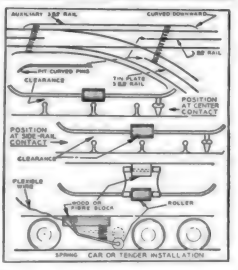
It is a good idea, when drilling the holes, to make those in the pepper shaker smaller. It can then be told at a glance and you won't get too much pepper all at once.

The holder is simply made, being simply a ½-in. slab of wood, cut diagonally from a limb 2 inches in diameter. Two quarter-inch holes are bored in this, and the handle, made of a small bent twig, glued in place.—*Paul Hadley.*

The Outside Rail

TINPLATE railroaders building their own switches usually have trouble with the 3rd rail shoe short-circuiting as it passes over the running rails. Commercial tinplate switches use molded non-metallic rail sections at these points, but the home builder will find it difficult to do so.

The use of an *outside* third rail AT SWITCHES ONLY eliminates all shorts and provides an even flow of current. The rest of the track remains as before. The conventional tinplate shoe or rollers are disconnected and may be removed. A modified collector shoe as illustrated contacts middle third rail until lifted clear of it (and above height of the running rails) by the outside 3rd rail, from which it then takes current instead,



entirely automatically. Tender affords a good installation on steam models, or the hinged shoe may be fastened into the body of an electric type at either or both ends. An insulated fibre block drilled for a pin provides support. Take care that no part of shoe touches body of engine or car in any position. Auxiliary third rail should be high enough to lift center roller above height of running rails. A spring provides pressure, but may be replaced by a small weight on 00 and HO sizes to avoid tendency of cars to lift. Fit ends of third rails with curved pins to take shoe up smoothly.

Drawing at left shows: Top—Suggested track layout (same as in photo); center—two head-on views of contact shoe touching center and side rails, respectively; bottom—profile view of installation for car or locomotive tender.—*Harry Walton.*

Four-Bladed Propeller Tried On Army Plane

A U. S. Army Air Corps P-36 pursuit plane has been fitted with the first controllable pitch four-bladed propeller ever tried in the United States in a study to find the propellers to go with giant airplane engines now under construction by leading manufacturers.

Performance of the radically new type of propeller will be compared with that of another unusual arrangement the Air Corps has been trying for more than a year: two "props" mounted in tandem on the same shaft and rotating in opposite directions.

As engines grow more powerful larger and larger propellers of standard type have to be used. Unfortunately, engineers are finding several limitations to increasing the size of the present three-bladed propeller. In order to keep the speed of the blade tips below the speed of sound, the propeller must be turned over more slowly. In addition, small pursuit-type ships would require unwieldy landing gears in order to give the huge propellers proper clearance of the ground. Another objection to the continued growth of propeller diameters is the increase in weight of each blade.

A Curtiss electrical hub controls the four duralumin blades of the new propeller. Theory of the addition of blades, engineers explained, is that it increases the solidity ratio of the propeller for a given propeller diameter, thus giving more efficient operation for given power and diameter, especially at high altitudes. Propellers using even more than four blades are not considered an impossible development of the next few years. No comment on results of tests thus far conducted on the four-bladed propeller is available yet.

Caffeine In Coffee In Compound Form

Important differences between the caffeine in your breakfast cup of coffee and chemically pure caffeine, including a lower degree of toxicity, have been discovered by Dr. H. Gebhardt, an investigator at the University of Munich.

Much of the caffeine occurring naturally in coffee, it has long been known, is in the form of a double salt of caffeine and chlorogenic acid. This compound, Dr. Gebhardt has now discovered, is only about half as toxic as pure caffeine and two to three times more effective as a diuretic, for which it is often used medically.

Greater speed of elimination is believed to account for the lower toxicity of the naturally occurring caffeine and for the greater diuretic effect on the kidney. Elimination of caffeine in the form of the compound with chlorogenic acid, he found, is up to 10 times greater than in the form of pure caffeine.

Sailplane Magic

[*Continued from page 39*]

streamlined struts, and in addition to the skid, it usually has a single wheel landing gear, equipped with a brake. This type, due to its comparatively low cost and practicability, is very popular.

But the queen of them all is the sailplane! It is a beautifully streamlined craft, having long tapering, gull-like wings of high lifting capacity. Construction is of metal or wood with the fuselage and part of the wings covered with plywood. These ships have extremely low sinking speeds, with gliding angles ranging between 20 and 30 to one. They can take advantage of slight upcurrents and can remain soaring aloft long after the utilities have been brought down by lack of slope wind. All types are equipped with regulation stick and rudders.

Flying a plane with no motor in it seems less miraculous to the man on the ground when he hears how the plane is built. The conspicuous feature of the sailplane is its very long, narrow wings—sometimes as much as 60 feet in length and less than 4 feet in width. Narrow wings are essential, for broad ones create too many eddies. The wings must be long to provide sufficient surface to lift a man's weight. The pilot maintains his speed by pressing down the nose of the plane. Gravity will then draw the plane downward at a slanting line of flight called a glide. But while this is happening, the vertical air currents carry the plane upward faster than it comes down! The up-currents, however, have no connection with the gliding angle.

When flying across country in a plane with no engine the pilot progresses simply by coasting from the top of one vertical air shaft to the foot of another. Of course, these upward currents are invisible but a trained glider-man knows which cloud and terrain conditions are most favorable.

With an average sailplane it takes about 12 to 16 minutes to glide to earth from an elevation of 2,000 feet. In the average gliding machine, however, one would descend in 10 minutes. But the sailplane enthusiast is not merely interested in a plane that sinks slowly. He also wants one that travels fast and far. Some interesting records have been achieved in this respect.

An official distance record was made by Rudolph Diltzschner, who achieved a distance record in a sailplane of 313 miles, in 1935. The world distance record of 405 miles is claimed by a Russian. Heindrick Dittmar achieved an altitude record of 14,190 feet in 1934. (Since then Erwin Ziller established an altitude record of 28,215 ft.) Dittmar gave a very graphic account of what it feels like to ride a cloud to such a height. He was towed aloft by an airplane and cast off at 1,150 feet. At that point he found a powerful up-draft.

"As I knew from many previous flights of the turbulence of such drafts," he wrote afterwards, "I drew my safety belt somewhat tighter so as not to be lifted out of the seat by the powerful gust. One quick look at the snap-hook of the parachute and then into the clouds.

"Hardly was I inside the clouds when I was greeted by the first violent gusts, and the farther I flew into it the more the machine became the plaything of the upward and downward moving air currents. The variometer which showed the rising and falling speed hit the end of the scale. The speed indicator went up to 93 miles an hour, only to return to zero at the next moment. A frightful jolt and I was hanging in my safety belt but I could not make out what position the machine had got into.

"To avoid its breaking up I tried to bring the speed as low as possible but I succeeded only with great difficulty. The compass was continuously turning around. The turning indicator stuck to the right and the inclinometer also did what it liked."

I can well appreciate Dittmar's feelings. I, myself, traveled over 120 miles per hour while riding a thunderhead in the 1937 championship meet at Elmira, N. Y., and was successful in pulling out only by skillful handling.

Occasionally an airplane pilot has the experience of riding what is known as a cloud "street." This is a long regular row of cumulus clouds in which the air rises on one side of the street and descends on the other. It is only necessary to get on the right side and keep going without spending time circling for altitude. Such a condition enabled me to establish my American distance record of 158 miles, in 1934. It also enabled me to establish an American altitude record of 6,224 feet in 1934. Both records stood for four years.

Such sailplane flying reveals many interesting facts. For example, pilots have found that one plane sometimes would be rising at 15 feet or so a second, while two other planes—one directly above, the other below—were getting no lift at all. This experience is confirmation of the theory that warm air rises in a succession of enormous bubble-like masses. The middle plane happens to be in the bubble; the others either below or just above it.

Another interesting incident was experienced by Birdman Hirth during a French competition. Hirth explained that he was able to soar a considerable distance at a very low altitude. And during one period of this flight the weather was so calm that he had leisure to look around while soaring low over the ground. While thus soaring he says, "Below on the beach I saw a boy receiving a thrashing from his mother. I shouted down, 'Hello,' as loud as I could. The lady immediately let go of the youngster who took this chance to run away. He may have been thanking me as his guardian angel, but an old woman gathering driftwood on the beach a little farther down must have taken me for Satan himself. She sat down on the ground and stared as she saw me flying silently and mysteriously along the dunes only 70 feet over her head."

Chester Decker, who beat me out of the 1936 national soaring championship by three points

tells a really exciting story of his prize-winning flight. Decker took off from Elmira, N. Y., on a day which looked decidedly poor for cross-country soaring. He spent the first few minutes of the flight looking for likely ridges. Things appeared pretty bad for him and he was rapidly losing altitude until he reached a point some ten miles south of Elmira, and here is where he found the first real thermal of the day. He related:

"The thermal hit the ship with such force that the wings bowed fearfully, then up I went in a steep spiral from 1,200 to 5,000 feet with my variometer showing a steady climb of five meters per second.

"Thrill of thrills—reserved only for soaring pilots and one that is intensified rather than tempered with experience! I relaxed—the sky was suddenly full of good clouds—the ground was a mile away straight under me—and I was so happy I screamed and startled myself with my voice!

"The clouds were lined up like conveniently located service stations, and I jumped from one to another for thirty miles, diving continuously to prevent being drawn into them.

"This was cloud-hopping at its best, and a thrill I'll never forget if I live to be a hundred!"

Decker had a fine time of it hopping from one cloud to another and he traveled 146.6 miles that day. This flight was considerably shorter than many long-distance flights achieved in foreign countries. Only by a long study of thermal currents have men been able to achieve three-mile altitudes and 400-mile distances that dot the history of soaring.

Some of these famous flights and the mysteries of the thermals which made them possible will be discussed next month.

Busman's Holiday

[*Continued from page* 66]

amateur who talks to W6QUT on the short wave doesn't realize that he's exchanging conversation with one of the most highly paid voices on the air.

"Andy"—Charles Correll—also does a bit of extra-curricular radio work when he operates the transmitter in his plane. However, he isn't a full fledged radio "ham" yet, but prefers the comparatively saner hobby of flying.

When radio finally does overwhelm him a bit, "Amos" finds relaxation in his darkroom. A miniature camera fan, he does all his own developing and enlarging, his favorite subjects being his two charming children, Freeman, Jr., aged 10½ and Virginia, 9.

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Potted Plants For Profit

[*Continued from page 45*]

small army of boys, and elderly men earn their living or pin money collecting the various plant products that Wilson's unusual enterprise consumes with the voracity of a flour mill.

For the last several years salesmen representing various manufacturers of paints, lacquers, varnishes and enamels have considered Lester Wilson a very important customer. Simultaneously the railroads have cultivated his friendship for the carload shipments of merchandise that flow in a steady stream from the San Gabriel plant to retail novelty shops throughout the nation.

Wilson has also contributed very substantially to the economic welfare of Mexico. Several years ago he began importing a wide variety of Mexican goods . . . leather products, pottery, glassware, objects d'art, articles of handicraft, etc. He is now one of the largest American importers of such goods and spends a portion of each year in Mexico, doing his buying chiefly in the markets of Guadalajara and Mexico City. These Mexican importations are retailed in California and wholesaled to novelty shops in all parts of the United States.

El Pintado is visited by practically all of an estimated 250,000 tourists who annually visit Mission San Gabriel, and few indeed are the visitors who fail to carry off an ornament and leave something in Wilson's cash register. Such sales are seldom less than 25c and often $25 or more. Since the shop is roughly 14 miles out of the high rent districts of metropolitan Los Angeles, its overhead operating expenses are obviously as low as its margin of profit is generous.

Why do people buy these ornaments? The answer to that question lies in the fact that normal human beings have a craving for color. A Spanish *patio* in California wouldn't be a *patio* without a few pieces of Mexican pottery, a string of chili peppers, an El Pintado charm sting, a bunch of red, yellow and purple Indian corn and at least one basket of painted gourds.

These ornaments may be found in American homes and novelty shops from California to Maine and from the State of Washington to Florida. The country is wide open to anyone with the business acumen to promote the same idea elsewhere as successfully as did Lester Wilson.

Fish Bookends

[*Continued from page 102*]

first, sand down and give two coats of gay enamel, white suggested. The base pieces may be enameled blue as desired or painted with wavy lines. For a natural finish two or three coats of varnish, each sanded down before applying the final coat gives a very handsome finish.—*Ralph T. Moore.*

Pituitary Gland Controls Hibernation

Warm-blooded animals that hibernate, or sleep through the winter, go into their almost death-like trance and wake out of it again on orders from the pituitary, the small gland beneath the brain that has already been discovered to be the "boss" of many other body activities.

The connection between pituitary and hibernation was discovered in experiments on ground squirrels carried out at the University of Wisconsin by Drs. Mark A. Foster, R. C. Foster and R. K. Meyer. They report their results in the new issue of the technical journal, Endocrinology.

Ground squirrels, it was found, have a definite waking and breeding season during which it is difficult—almost impossible—to induce hibernation by experimental means. But when the breeding season is over and the young weaned and able to shift for themselves, the animals can be put to sleep by subjecting them to suitable conditions.

Untreated ground squirrels placed in a cold room with the temperature hovering near freezing point, and "dehydrated" by being given only dry food with no water, went into the hibernating stage before the season outdoors called for it. They changed from warm-blooded into cold-blooded animals and their breathing and pulse rates became very slow.

The cold-blooded state, with hibernation, could be induced at any time by surgical extirpation of the pituitary. Contrariwise, hibernating ground squirrels could be aroused at least temporarily by injection of pituitary extract. Deprivation of other glands, and feeding or injection of other gland substances or extracts, including those of the sex glands, were without effect.

Flowers Turned To Gold

[*Continued from page 55*]

tube. The tube is then filled with plaster of Paris, the tip of the pin protruding.

When the flower is thus covered with plaster of Paris, the pin is removed and the whole tube placed in an electric furnace, where it is subjected to a temperature of 2,000 degrees. This completely vaporizes the flower, leaving in its stead a microscopically perfect mold. Molten gold is then forced by hydraulic pressure through the tiny hole left by the pin.

The gold fills every corner of the mold, so that when it is broken, an accurate golden reproduction of the flower is revealed. If a pearl is to be mounted, a drop of wax is placed on the flower. When reproduced in gold, this serves as a mounting for the jewel.

After the golden flowers are buffed and polished, they are mounted with gold solder to earring clamps, stick pin shafts, clips, etc. Dr. Gray says that, as the process is almost identical with that of casting gold inlays, it can be duplicated by any dentist.

New Alloy Guards Vacuum

[*Continued from page 53*]

Because of its ability to expand at approximately the same rate as hard glass, Kovar has proven itself the most efficient guardian existent for keeping air out of electronic devices once they have been partially evacuated. Reduction of the air-content of such devices is necessary to prevent the molecules of air from deflecting and impeding the flow of electric power through the containers. In the radio industry alone, Kovar has made possible the manufacture of transmitter tubes which are 10 times more powerful than any built 13 years ago.

In the power systems of railways, Kovar has made possible even greater increases in efficiency by its application in "Ignitrons" and rectifiers, gas discharge devices which interchange direct and alternating current. "Ignitrons," a major step toward the ideal mercury arc rectifier, can now be made of metal instead of glass, with the metal unit capable of handling 100 times as much power as the old style glass rectifier tube of equal size.

The list of Kovar's uses seems endless. It is now at work sealing the glass in gas meters and water meters, holding "windows" in place in X-ray tubes, and a patent has only recently been granted covering the application of Kovar to make spark plugs vacuum-tight.

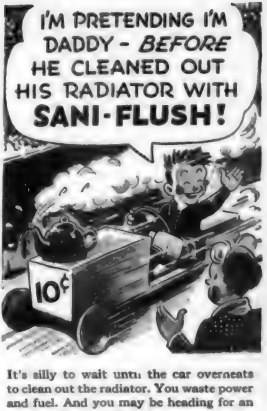
Kovar was developed by Howard Scott, a metallurgical engineer in the Westinghouse Research laboratories in East Pittsburgh, from four other metals—nickel, cobalt, manganese, and iron. The result was a new allow which fuses with glass, does not crack the glass by expanding or contracting out of step, and is cheaper than any other metal which can approach it in its task of conducting an electric current through a glass wall.

"Kovar's value," the inventor explains, "lies in its ability to make an air-tight seal between lead-in wires, terminals, metal bases and glass, and in its ability to be machined or shaped into any form."

Scott began searching 13 years ago for better low expansion alloys for use in thermostats. The result of his search and experimentation was a combination of four metallic elements in approximately the following proportions: 29 per cent nickel, 17 per cent cobalt, two-tenths of 1 per cent manganese, and the balance iron. Early developments suggested to Scott the possibility of using this combination not only as a thermostatic metal but as a cheaper and more workable material than tungsten or molybdenum for sealing into glass. It passed the first test when it proved resistant to mercury attack, as mercury is the usual source of a conducting vapor in many of the electronic tubes.

Now developed to commercial production routine, Kovar can be cast in 250-pound ingots and is forged and rolled much as any other metal. "However," its inventor states, "Kovar has to be melted more accurately than any other marketed

[*Continued on page 119*]



It's silly to wait until the car overheats to clean out the radiator. You waste power and fuel. And you may be heading for an expensive repair bill.

Don't wait! Use Sani-Flush regularly at least twice a year to clean out automobile radiators. Do the job yourself. It costs only 10c (25c for the largest trucks and tractors). Just pour in Sani-Flush. Run the engine. Drain, flush and refill (*directions on the can*). That's all there is to it. And your radiator is sweet and clean. If you prefer, ask your garage or service station to do the job for you. Insist on Sani-Flush. It cannot injure motor or fittings. You'll find Sani-Flush in most bathrooms for cleaning toilets. Sold by grocery, drug, hardware, and five-and-ten-cent stores. 25c and 10c sizes. The Hygienic Products Company, Canton, Ohio.

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G. & M. MFG. INDUSTRIES, 2101 W. Forwell Ave., Milwaukee, Wis.

Robot Secretary

[*Continued from page 48*]

The appliance is a voice recording and reproducing unit as light and compact as a portable typewriter. It records 7,800 words (ten average-size letters) on a collar of cellophane-like material which costs but five cents and is so thin that three of them (containing about 25,000 words) can be folded into an envelope and mailed for a three-cent stamp. The same machine may be used to "read" the messages by playing them, like a phonograph record. They last for years, and the messages may be filed like other communications and "read" when necessary, or they may be transcribed on a typewriter, using loudspeaker or amplifier for the process. The sound amplifier used is so small it may be held in the palm of the hand yet it magnifies 477,100 times.

For the use of salesmen and tourists, an attachment makes the device adaptable for use in automobiles, getting its necessary current from the auto batteries. The tourist of the future therefore will be able to record his impressions of the beauties of nature "on the spot," and, without tedious scribbling on postcards, mail the record forthwith. The salesman, without bothering with written reports or with secretaries, will record an interview or his orders into the machine while enroute to his next stop and airmail the voice letter back to the home office. The executive will have with him, 24 hours of the day, a secretary ready to take down his thoughts; traveling with him at no extra fare while on the road.

When the office closes for the day, a flick of the finger changes the robot office secretary into a "phone girl." The sound of a phone ringing causes it to lift the receiver and say: "Mr. Blank is not in, but I'll record your message or have him call you."

Similarly it may be set so that the sound of a window opening will start it shouting for help.

It may be set to go on at a certain time and take a radio broadcast for an absent owner, shutting itself off automatically at the conclusion. The owner can play the record at his convenience.

It will record both ends of a telephone conversation, as well as oral or business deals, for filing or legal use, being as authentic evidence as a signed letter. It may also be used for scientific eavesdropping.

Since the machine will record ordinary conversational tones within a radius of 20 feet, it is possible to record a discussion or business conference participated in by a roomful of men.

Foreign languages may be taught by mail with the same efficiency as by personal contact. It will assist actors with rehearsing, since they can hear themselves as others hear them.

The sponsors claim that in the future novels and magazines will be translated into this medium. With the use of earphones, the Tired Business Man, saving his eyes, can then read himself to sleep in the dark, without disturbing in the least even the wife at his side!

Radio Buoy Bares Depth

[*Continued from page 51*]

Reading from this chronograph tape the ocean surveyor can measure the time interval between the firing of the bomb and the receipt of the radio signal. Knowing the velocity of sound in water, which is roughly 8/10 of a mile per second, the distance can then be computed very easily.

"The Fathometer works on the echo sounding principle—sends out a series of sharp rapping noises from the ship's bottom, catches the rap echo which resounds from the ocean bottom and instantly reports the exact depth of the water under the ship at the moment. It works at high speed, reporting the depths as frequently as 20 times per second, even while the vessel on which it is mounted steams along at full speed. This means that if the vessel is going 10 knots, a sounding is obtained once every 10 inches.

"Fifteen minutes after firing the first shot the ocean surveyor drops another one into the water and may follow the same procedure at such intervals for a day or more. The reason he needs the sono radio buoy in connection with the soundings taken by the Fathometer is that the latter device tells you the depth but not the location."

Some 20 SRB's are today in actual use by the Survey. These are all "home-made," constructed on the Survey vessel whenever they are needed for sounding work.

Each 50-pound steel drum containing the equipment is air and water tight and usually is unaffected by the terrific battering of wind and water. It is a high quality radio transmitter of low power—about six watts. Apparatus includes: An A, B and C battery and six tubes of two volt filament, types 30, 32 and 33. Each surveying ship has its own radio frequency for radio sounding work. Crystals for this work are ground to the same frequency within about 10 cycles, which is close enough since the timing condenser may make 50 to 100 cycles difference in the emitted signal.

Two ships working in the same vicinity do not interfere with each other as one will have the frequency of 4160 kilocycles and the other, 4135 kilocycles. In another locality one will have 2492, a second; 2496 and a third, 2500 kilocycles. For any particular ship the SRB frequencies will be such that the radio signals will come in as two or three separate whistles of slightly different pitches. Since all the SRB's are in water of nearly the same temperature, the frequencies of call may rise or fall slightly with the temperature of the water; but once put on station the frequencies remain constant except for this slight temperature effect. The useful range of the SRB varies with the depth of the water, being from about 15 nautical miles when anchored in 10 fathoms, to 50 or more miles when anchored in 50 fathoms.

Adding calcium salts to tomatoes is found effective in keeping the tomatoes firm and whole in canning.

Free Power From The Sun!

[*Continued from page 59*]

directly in the vacuum-jacketed glass focus tube. Circulation is provided by bringing back from the oven sheath a small metal or glass tube within the focus tube, to near its lower end. Such a focus tube passes freely through the hollow trunnion at the upper end of the mirror, and is sealed by packing going through the metal sheath which encloses the oven. Accordingly, as one wishes for a quickly heated oven, or for one to remain hot through temporary cloudiness or at night, the oven sheath contains little or more of the liquid. This part of the sheath or box may be surrounded by a thick layer of glass wool for insulation, leaving, of course, means for reaching the oven door.

With this arrangement a mirror 4x8 feet will keep two ovens of ordinary size hot enough to bake biscuits, by night or by day, in any fairly cloudless region in the temperate zone. I have baked biscuits with a small model of this solar cooker.

Efficient solar heat units are made possible by the commercial development of aluminum products and the common use of vacuum devices which came with the incandescent lamp and radio industries. Formerly, inventors relied on glass mirrors which were heavy and costly. It is now possible to use thin sheets of aluminum which readily take the curvature of a suitable cradle form without previous shaping. This material reflects over 80 per cent of solar radiation and may be used for years without dimming.

The latest improvement in solar heaters is the automatic control of the water-flow through the solar flash-boiler. This is an engine of a single-tube boiler, protected from heat losses by an elongated glass vacuum jacket, and fed by a current of water automatically graduated in flow by the temperature of the boiler. Five minutes of sun will raise full steam pressure. Should the sun enter a cloud, the water supply is immediately cut off. Should the steam pressure rise above the desired maximum, the water supply is automatically increased. Thus the boiler takes advantage of all the clear sky between clouds.

It will never be possible to harness all of the light and heat of the sun. Too much is lost by reflection and other leakage. But the immensity of the sun's energy and the amount of heat it continually emits is terrific. If I turn on a 1,000 candlepower lamp, it seems blindingly bright. But the sun's surface for equal area emits about five times as blinding a beam as this lamp does and the area of the sun's surface is about 8 billions of billions times that of the lamp filament. The sun is bright enough to really blind you. Plateau, a Belgian scientist, wished to study the after-images left within his eyes by a bright light. Looking at the sun for 20 seconds, he lost his sight completely.

Every year the sun loses heat equivalent to 400 billions of trillions of tons of coal. Of this pro-

[*Continued on page 119*]

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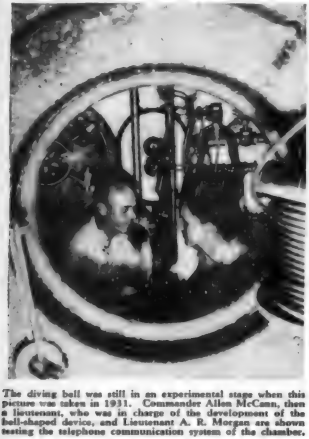
Bell Saved 33 Squalus' Crew

[*Continued from page 65*]



The diving bell was still in an experimental stage when this picture was taken in 1931. Commander Allen McCann, then a lieutenant, who was in charge of the development of the bell-shaped device, and Lieutenant A. R. Morgan are shown testing the telephone communication system of the chamber.

foot down-haul cable. The winch is in the lower compartment.

In the *Squalus* rescue, the bell was swung from the navy salvage vessel *Falcon*. The cable from the winch was reeled out, and a diver was sent 240 feet down to the submarine. He made the cable fast to the escape hatch of the *Squalus* and returned to the surface to give the word "All Fast."

At this signal, the upper compartment of the bell was closed off and the compressed air motor which operates the winch was turned on, winding in the cable slowly and pulling the bell directly to the escape hatch. Divers descended with the bell, helping to guide it so that the open bottom fitted perfectly over the escape hatch and then hooking turnbuckles from the bell's bottom into cats-eyes on the skirt around the submarine's hatch.

The rubber gasket around the bottom of the bell acted with suction against the shell of the *Squalus*, and together with the cable, now wound and taut, held the bell in position for the actual rescue. Suppose we listen to a naval officer describe the procedure from there on—

"With air supplied from above, the water in the lower chamber is blown out and valves are closed to prevent the water re-entering when the air is turned off.

"Then the hatch cover between the upper and lower compartments in the chamber is opened. More lines are attached from inside the bell to toggles around the hatch of the submarine. The bell, now securely fast, resembles a blister on the outer shell of the crippled craft.

"The hatch of the submarine is opened. The men to be rescued are taken aboard the chamber. The submarine's hatch is closed. The men in the bell go into the upper compartment and the hatch to the lower compartment is closed. The connections holding the bell to the submarine are disconnected, the winch is reversed to pay out the cable, and the bell makes its way to the surface by virtue of its original flotation principle."

Sounds simple enough, doesn't it?

But it isn't quite as easy as it sounds. Remember that if the submarine happened to be full of water when its hatch was opened, the gush of water at full pressure would kill the rescue crew in the bell immediately. There's danger, too, in the air pressure within the bell; the sudden increase in pressure as the air, pumped into the lower compartment to expel the water, is released through the upper compartment is proportionate to the depth. In deep water this operation must be done with minute care, giving time for vent valves in the upper compartment to allow the excess pressure to escape.

And not the least important factor to be considered is the original ballast required to keep the bell in slightly positive flotation so that it will rise as released by its own cable. A miscalculation on this one factor could very easily have added the bell crew to the list of dead. The men in this rescue knew their jobs—and submarine rescue history was made!

Navy experts, enthusiastic about the bell, say that its great advantage over all previous rescue apparatus is that the air pressure within the chamber can be kept at normal. As one summed it up:

"With the apparatus all danger of 'bends'—too sudden a decrease in pressure which allows oxygen globules to enter the blood-stream of its victims—is obviated. It is gratifying to us that the technicians of the Navy Department have developed a humanitarian device which will be of invaluable service throughout the world if properly handled."

The bell has been offered to other nations with no takers up to now, but after its dramatic use in the rescue of the 33 men on the *Squalus*, a rescue that was followed eagerly by naval men the world over, there seems little doubt that other nations will soon avail themselves of the United States' humanitarian offer.

Man's fastest speed in an airplane is about 440 miles an hour, but the deer botfly speeds almost twice that fast—818 miles per hour.

A chemist points out that the human nose contains the most perfect air conditioner known—in the space of less than a cubic inch.

The "Flying Hamburger"

[*Continued from page 83*]

balsa. Follow the outline of the plans carefully and sand to about 1-64 inch at the tip. Sand a slight curve into the base of each wing. This is done to form a perfect joint between the wings and the "Hamburger." Cement wings in place and place 2 inches dihedral under each tip.

Propeller may be purchased from any model supply store, or it may be carved from a block of balsa ¾x½x6 inches. Bend propeller shaft from .016 wire and attach to propeller. Slip two small washers on to shaft and slide through thrust bearing. Power model with two strands of ⅛ inch flat brown rubber.

Cement all surfaces in place as shown on plan. The model is now ready for flying.

The "Hamburger" differs in no way from any other model as far as flying and adjustments are concerned. Right and left turns are made by warping the rudder. If the model stalls warp the stabilizer down, if it dives warp it up.

Many hours of more enjoyable flying can be had by the builder if he chooses to experiment with different adjustments of the surfaces.

Free Power From The Sun!

[*Continued from page 117*]

digious amount, this country intercepts the equivalent of 200 billions of tons. This is 400 times the energy consumed by us from coal.

It is probable that so long as coal is cheap and abundant, there will be no extensive use of solar energy. However, small installations, in two to five horsepower units are being used profitably under favorable conditions. The classic use of solar power is, of course, for irrigation. It is conceivable that great reservoirs might be pumped full of water from rivers and lakes by solar power in dry months to irrigate land when rain fails.

It may be but a few short steps from these practical units to an arrangement of devices powerful enough to supply a whole city of 1,000,000 people with light and power at a fraction of present costs. Other solar mysteries have been solved by scientists and engineers, so this accomplishment is not inconceivable, nor far off.

New Alloy Guards Vacuum

[*Continued from page 115*]

alloy. The elements going into it have to hit within a tenth of 1 per cent, and the mix has to be heated in an electric induction furnace in which high frequency currents set up lines of electrical force inside the batch of metal and cause it to heat itself."

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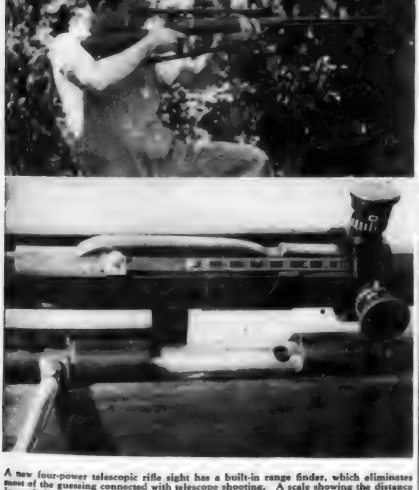

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Iodine Seen Necessary For Health Of Plants

Iodine may prove to be as necessary for plant health and growth as it is for that of humans, Professor W. L. Powers of Oregon State College suggests, announcing the preliminary report of ten years of experiments with plant species ranging all the way from spinach to bacteria.

The plants were grown in soil-less cultures, with nutriment solutions constantly flowing around their roots. The amounts of iodine found necessary were very minute: one part of iodine in from two to four million parts of water was sufficient.

Iodine seems to be in some way necessary for chlorphyll formation and reaches particularly high concentration in spinach and head lettuce. Yet lower plants without chlorphyll, including yeasts and the nitrogen-fixing root-nodule bacteria, also throve better on iodine-containing media.

Professor Powers points out that one of the values in using seaweed as a fertilizer, a common practice along all seacoasts, may be in the iodine thereby added to the soil. He suggests also that putting potassium iodine into irrigation water may eventually become standard horticultural procedure.

A new refrigerator has a separate compartment so cold that it would be possible to quick-freeze foods at home and keep them frozen until needed.

Russian knapweed, a weed probably brought into the United States with Turkestan alfalfa seed, is now troublesome in North Dakota.

Self-Steering Rockets Use Tiny Gyroscopes

Tiny gyroscopes—midget versions of the gyroscopes used to minimize roll on great ocean liners—are used to control the direction of rocket flight at the isolated laboratory of Professor Robert Goddard at Roswell, N. M.

Professor Goddard, Clark University physicist on leave, is supported in his rocket researches by the Carnegie Institute of Washington and the Guggenheim Foundation.

The Goddard rocket gyroscopes are set to apply a controlling force when the long axis of the rocket deviates more than ten degrees from the vertical. Initial experiments utilized the gyroscopic control only during the time of the propulsive gases which make the rocket rush upward with terrific speeds.

After that time the rocket continues onward and upward in a smooth curve. Motion pictures of rocket flight show the rocket shooting upward in a slowly wavering curve as it is corrected, first to the left and then to the right, for deviations.

It should be possible, Professor Goddard has indicated, to apply a compressed air system in the rocket which would be controlled by the gyroscope and which would force the directing vanes out into the slip-stream of the rocket and further aid vertical flight.

The average productive life of a cow is only five years, in New York dairy herds.

Workers in automobile factories have added to American slang a whole list of names for car parts, such as dog collar, tin hat, pancake, spider, and banjo.

ADLETS FOR HOBBYISTS

(See regular classified section for rates and other information.)

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Photographed Map

[Continued from page 69]

and every township—and the most accurate map of the United States ever put on paper.

And it will be by far the cheapest complete map ever made of these United States, costing about three cents an acre against about six cents an acre for mapping by the old-fashioned, less accurate, and slower methods.

The U. S. Department of Agriculture thought up the idea of aerial mapping the country to check if farmers are living up to the crop control agreements—but, like a lot of other new ideas, the by-products became more valuable than the main product.

Of course, the job is far from done, for it's a slow job. It will take thousands of air hours and scores of thousands of aerial photographs to finish the task, which will show every highway, and every turn in every highway, every bridge, every cornfield and every woodshed in America.

Ohio is only one of the 48 states being air-mapped—but the program is more nearly complete in Ohio than in most other states, and Ohio already is realizing greater benefits from it than are most other states, says Lloyd O. Herd, assistant supervising engineer in charge of aerial mapping for the Ohio Agricultural Conservation Committee.

Already 59 of Ohio's 88 counties have been air-mapped in the project. Contracts recently were let for air-mapping 10 other counties and other contracts will be let soon. Already over 45,000 individual photographs of more than 43,000 acres of Ohio farms have been taken by the planes which shuttled back and forth over 25,000 miles.

These air-mapping pilots and photographers can't exactly kick about long working hours, explains Herd. In fact, they kick about lack of working hours. If it rains, they don't fly; if it's too windy, they don't fly; if it's slightly overcast—perfectly flyable weather—they don't fly. Often for weeks at a time, they don't fly. And the hours a day they can fly are limited, too.

When they do fly, they must fly at 14,000 feet, because the federal government has specified that the pictures must be scaled three inches to each mile. Fourteen thousand feet works out best for this scale.

The job takes fine co-ordination between the pilot and photographer. The pilot must keep his ship exactly on a straight line, carefully compensating for his drift—and often at high altitude the drift is tremendous. And the photographer, with a stop watch, checks his ground speed, shooting, if the ship is at a ground speed of 120 miles per hour, one picture every 40 seconds.

Parading back and forth over a route in lines two miles apart, the crew snaps 200 pictures each flight, each picture covering an area two miles long and three miles wide.

Sure, there's a tremendous waste—but a waste in the interest of accuracy and efficiency. The flight lines overlap each other about 30 per cent and the pictures overlap about 60 per cent.

Then comes the job for the studios—the job of developing and printing and fitting together the pictures to make the complete maps.

First ordinary contact prints are made and checked for completeness. Then comes the most exacting job of all—measuring exact scale. Since, in rough air, it is difficult to hold exact altitude, the scale of the contact prints sometimes varies.

Sometimes an inch on one print represents 1,600 inches on the ground; and sometimes an inch may represent 1,800 or 1,850 feet, and to fit together the contact prints might throw the complete map out of proportion.

This problem almost stumped the air map makers for a time. But they finally learned that by measuring the roads, bridges and ground areas, they could work out the exact scale of the individual pictures—and then print enlargements to exact scale size, one square inch to 10 acres.

The pictures are next carefully fitted together, overlapping is cut away, and a complete map of an entire area is ready. The maps are made up generally into individual maps, each two feet square and showing 5,760 acres of land.

This is the most ambitious aerial photography project ever attempted—and one of the most useful. For many startling new uses are being found for the photographs. For instance . . .

An Ohio farmer walked into a county agricultural agent's office where some of the photographs were on file and explained his problem.

"I've lost my blueprints showing the location of the drain tile on my farm," he said. "What shall I do?"

"Maybe," suggested a clerk, "the air map will show it."

It did! It showed the soil over the tile line lighter than the soil on either side because of the loss of moisture.

Another farmer, too, presented his problem—that of ordering exactly enough fencing for his fields. Air maps of his farm were brought out, the fields were measured and he was told how much fence material to buy. Again the map was correct.

One photograph was used recently in a court battle to show the need of a new road to eliminate a dangerous curve on which a number of fatal accidents had occurred. The photographs also are used by highway officials and utilities for studying highways, transmission lines, pipe lines, railroad locations, telephone lines and for other purposes. The U. S. Forestry Service uses them to study stands of timber.

And the U. S. Army engineering corps, which has charge of all navigable streams, navigation aids and flood control projects, uses the photographs in their engineering studies, since they show any dangerous obstacles to navigation which may be building up under water, any signs of erosion starting, or any growing flood menaces.

Baseball Pitching Gallery

[*Continued from page* 96]

Drill four holes in the lower ends of the iron supports, riveting them to one wing of heavy cabinet hinges. Attach the lower wing of the hinge with screws to the beveled edge of the board. The large target should be supported midway between top and bottom edges of the box, the two-base target also about midway, and the three-base target 8-ins. below the top edge of the box. Drill a small hole in each of the strap iron supports as shown, and fasten heavy cord lengths to each support, tying these lengths to the main tip-up cord. Adjust the cords properly so that you can tip up one or all the targets with one pull on the cord. Bend at right angles the ends of a length of strap iron, and fasten it at the ends of the box, just above the beveled edge of the board, to serve as a rail. The bevel allows the targets to tip forward slightly, yet the rail holds them upright. Fasten two strips of strap-iron across the back of the large target to keep it from cracking under the barrage.

Stand at a line about 25 feet in front of the target gallery. Each pitcher has three tosses. If he misses the gallery box entirely, he is called out. A pitch which goes inside the box, with no target knocked down is one strike. As soon as one of the targets is knocked down, his turn is ended, and he takes his second turn at bat, and continues pitching until the three turns are used up. Then the opponent starts pitching his three turns, to complete the first inning.

Let's suppose you pitch your half the inning: the first pitch goes wide of the box, and hits the side of the barn or garage (which is a handy thing to have back of the gallery, by the way), and you are out. Your second time up is better. The first pitch strikes the back of the box for a strike, and the second knocks down the one-base target. You have a man on first. Tip up the target and prepare for your third turn at bat. The first pitch is a strike, but the second hits the bull's-eye (beginner's luck), ending your half of the inning. The home run drove in the man on first, for two runs. Other things might have happened in a real game, but in the gallery game you can only add bases to get runs. Two doubles, a triple and single, and so on will produce a run. Four singles won't, since you have only three turns at bat. A single, home-run, and double would produce two runs with a man left on second base, but a single, double, and home-run would produce three runs with no one left on base. Play out the full nine innings, keeping score of hits and runs on a paper score sheet. Six persons can also play the game, with three players on a side. Each of the three players on a team takes one turn at bat.—*H. G. E.*

The University of California has a new flea laboratory, where fleas will enjoy air conditioning while scientists study the flea's role in carrying sylvatic plague.

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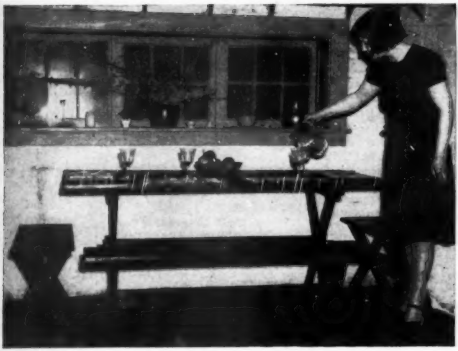

Attractive design and simple construction requiring no special tools are featured in this dining set. Table top is removable, being held in place by dowels.

[*Continued from page* 85]

but the benches will require six complete legs to take care of the division in the benches already referred to and clearly shown in the plans. Use the dimensioned patterns given in Fig. 6 to lay out the legs. Note that a slight difference exists between top and bottom of the legs and mark each piece accordingly so that when the final assembly takes place everything will line up and be square and true.

Note also that table legs are of slightly larger stock than the bench legs. This is not essential for strength but saves a little on lumber and is generally neater practice.

After laying out and cutting the legs check them carefully for exact agreement and set them aside for the time being. The tie-bars or braces are next attended to. These can be the same size lumber for both table and benches but following the plans given will result in a more balanced effect. Note that the table tie-bar has a definite shoulder where the tenons occur and that it is cut from a much larger piece all-round than the pieces used for the benches.

Cross pieces of 1x2½-in. stock are secured to the table legs by ⅜-in. carriage bolts as shown and the legs are then set up and the tie-bar locked in place by the hardwood wedges as shown in the detail sketches.

The table top is made from two lengths of ¾x12-in. stock and one length of ¾x6-in. material—all figures referring to trimmed size. The top boards are firmly joined as shown in Fig. 4 and the top is ready to be secured to the legs. Fig. 3 shows the general assembly. It will be seen that the top is held to the crosspieces by ⅜-in. dowels. The holes for these dowels should be drilled only after assuring yourself that the top is laid correctly. Drive the dowels home hard to a flush fit with the table top and the joint will hold without the use of glue.

The benches are assembled in similar manner with the exception that wood-screws are used in place of dowels and, of course, the top or bench seat is made from a single board. The details of the bench assembly are shown in Fig. 8.

When the pieces have been assembled they should be sanded down to a smooth surface

[*Continued on page* 129]

The two short benches may be stood side by side to form a modern cocktail or tea table.

Block-House Den

[*Continued from page 97*]

You can put loop holes on opposite sides of the block-house if you wish, and a window on one side. The short sections of logs between loop holes must be nailed to each other, and to the logs directly above and below, so they will stay in place. Cut and trim a center pole 6½ feet high and 4 inches thick. Nail it to the center of the floor. Cut four rafter poles 5 feet long and about 2 inches thick, nailing them to the top of the center pole and four corners of the walls (Figs. 2 and 5). Nail a pole to the top of the center pole, for a pennant or flag staff. Stand on a box placed on the floor, when finishing the roof. Cut sections of trimmed poles, nailing them across the rafters, one section of the roof at a time, and spacing the poles about 8 inches apart. For the roof cover you can use tar paper tacked to the poles and overlapped at the four ridges, or you can use old canvas sacks. Rip open the sacks, stitch them together making four sections to cover the four sections of the roof, and dye them brown. To weather-proof the canvas, shave one pound of paraffin in one gallon of gasoline, and when it is dissolved, sponge the canvas with the solution, letting it dry before tacking it to the poles. The draw ladder is made from sections of poles, nailed together as shown, with the upper ends of the ladder fastened with rope to the one-by-six cleat (Fig. 3). Tie a rope to the lower end, running it through a window or loop hole, so that it can be raised or lowered. The supporting poles under the platform can be enclosed on three sides with "logs" (Fig. 4), if you wish.

Refectory Table, Bench Set

[*Continued from page 128*]

and the application of the finish may commence. The finishing is extremely simple work to do. Obtain a pint of any good oil stain in the color desired (this is sold by Devoe paint shops and many hardware dealers), a small quantity of clear or white shellac, and a little wood alcohol to thin out the shellac should this be necessary.

Apply the oil stain with a large flat brush and let it stand a few minutes after everything has been thoroughly covered. Then wipe off the excess stain with a soft rag until the shade seems about what you desire. Let the stain dry overnight at least and then apply a thin coat of shellac which has been brought to the right consistency by adding alcohol. The shellac should dry in an hour or so and then the whole business can be given another gentle sanding with fine sandpaper. Now wax the entire surface and you will have a finish to be proud of and hardly discernible from the highest quality store furniture.

Don't use the oil stain too heavily and don't shellac it until thoroughly dry—and then only with a thin coat. The shellac prevents the wax from penetrating into the wood too deeply.

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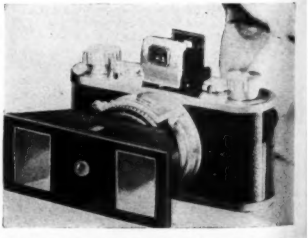
A propeller puller removes two, three or four bladed wheels without dismantling. Easy to work, it assures safety for wheel, shaft and bearings.

A steel ironing cabinet which is easy to install in the home has an ironing board that opens out, cover and pad for the board attached by special clips, an iron rest and other gadgets.

Persons allergic to pillow fillings may seal mattresses and pillows with a new paint, which is applied by brush. It leaves a smooth, lasting film, which may be washed.

For conveyors, ramps, floors, chutes and the like an abrasion resisting paint is made.



A device can be attached to the lens of a camera to produce a pair of photographs from different angles at the same instant and on the same film. This gives the effect of true third-dimensional pictures.